

# **Tektronix®**

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**PLEASE CHECK FOR CHANGE INFORMATION  
AT THE REAR OF THIS MANUAL.**

## **CAMERA SYSTEM C-50, C-51, C-52 & C-53**

**AND ACCESSORIES**

### **INSTRUCTION MANUAL**

**Tektronix, Inc.  
P.O. Box 500  
Beaverton, Oregon 97077**

Serial Number \_\_\_\_\_


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**Tektronix**

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### INSTRUMENT SERIAL NUMBERS

Each instrument has a serial number on a panel insert, tag, or stamped on the chassis. The first number or letter designates the country of manufacture. The last five digits of the serial number are assigned sequentially and are unique to each instrument. Those manufactured in the United States have six unique digits. The country of manufacture is identified as follows:

B000000	Tektronix, Inc., Beaverton, Oregon, USA
100000	Tektronix Guernsey, Ltd., Channel Islands
200000	Tektronix United Kingdom, Ltd., London
300000	Sony/Tektronix, Japan
700000	Tektronix Holland, NV, Heerenveen, The Netherlands

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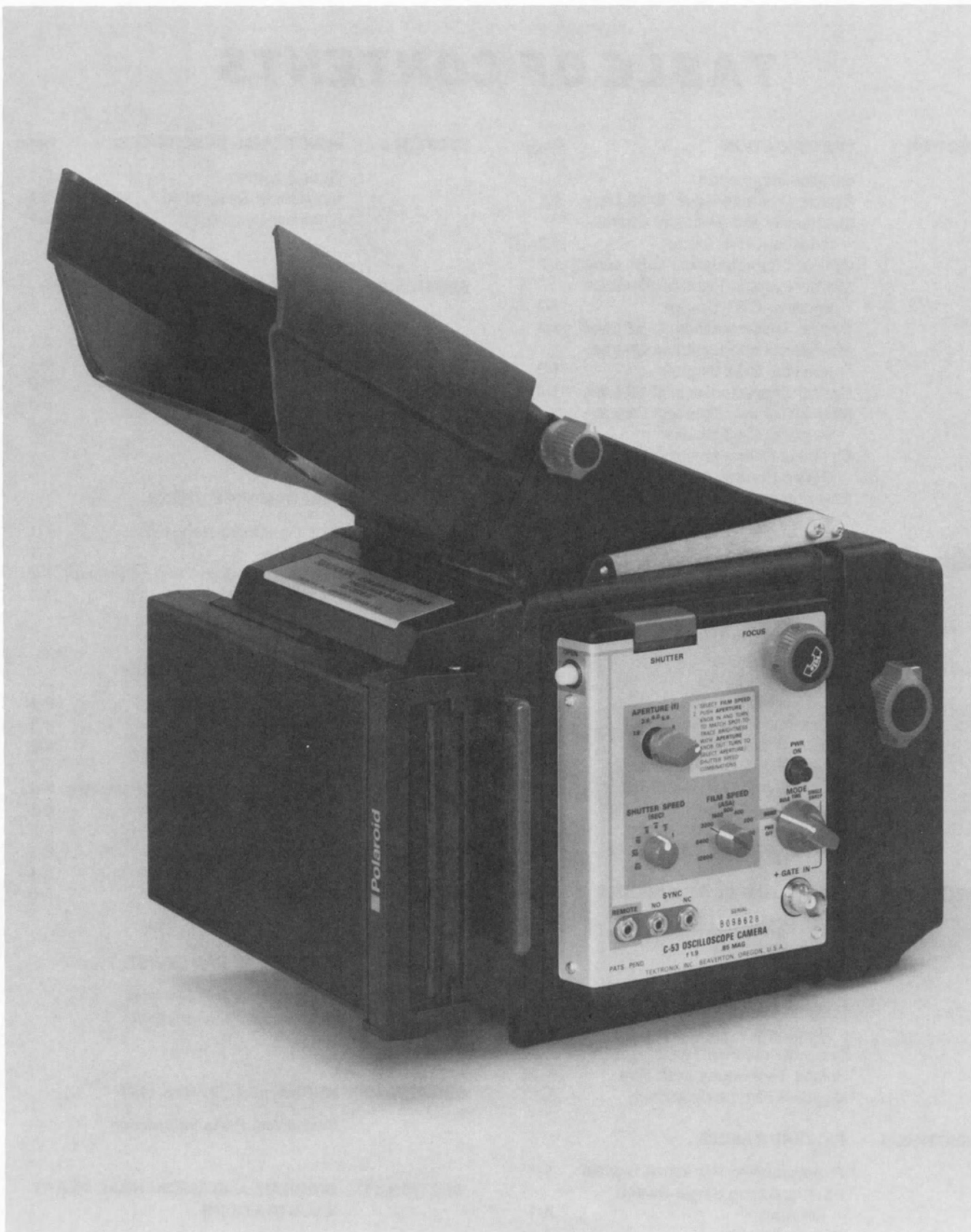


Fig. 1-1. Typical C-50, C-51, C-52 and C-53 Camera.



# SECTION 1

## SPECIFICATION

### General Information

The C-50 Series Camera is a compact, light-weight, trace-recording camera featuring an accurate exposure control that mechanically selects the proper aperture and shutter speed for a wide range of film speed ratings and display luminance.

The C-50 Series Camera is designed for use with all Tektronix 7000-series oscilloscopes but will fit any oscilloscope that presently accommodates a Tektronix C-27 camera adapter. The camera housing will accommodate either a <sup>1</sup>Polaroid Land roll or pack, or a 4 inch x 5 inch film back.

When the C-50 Series Camera is used with the Tektronix 7000-series oscilloscopes, a 3-pin connector in the oscilloscope bezel applies power to the camera and receives from the camera a pulse for resetting the oscilloscope sweep when the oscilloscope and camera are both in single-sweep modes. Also, when the oscilloscope and camera are in the single-sweep mode, the + gate output from the oscilloscope can be applied to the + gate input connector on the camera to close the shutter 5 seconds after the end of the oscilloscope sweep.

If the camera is used on oscilloscopes other than Tektronix 7000-series oscilloscopes, external power must be supplied to a connector inside the right side-panel to enable the camera to operate. Consult your local Tektronix, Inc. representative or field office before connecting an external power source to the camera.

The camera shutter is electrically actuated (through a shutter actuator circuit) by use of either a pushbutton or remotely through a remote input connector. Both the pushbutton and remote input connector are located on the control panel.

<sup>1</sup> Registered trademark of the Polaroid Corporation.

The electrical characteristics described in Tables 1-2, 1-4 and 1-5 are valid over the stated environmental range for instruments calibrated at an ambient temperature of +20°C to +30°C and after a 2-second warmup period unless otherwise noted.

TABLE 1-1  
OPTICAL CHARACTERISTICS  
C-50 LENS

Characteristic	Performance Requirement
Maximum Relative Aperture at Infinity	f1.9
Focal Length	57.6 mm nominal
Coverage at Maximum Relative Aperture	At least 130.00 mm diameter in object plane
Magnification (Object: Image)	1:0.7 within 5%
Geometrical Distortion	0.2% or less
Relative Illumination	Illumination at an angle of 20 degrees from optical axis of the lens to be at least 30% of the illumination of the optical axis
Photographic Resolving Power	
Center Pattern	At least 30 lines/mm
Each Corner Pattern	At least 15 lines/mm

TABLE 1-2

MECHANICAL AND ELECTRICAL  
CHARACTERISTICS

## C-50 SHUTTER (f1.9 LENS)

Characteristic	Performance Requirement
Speed (Normal) Range	4, 2, 1, 1/2, 1/4, 1/8, 1/15, 1/30, and 1/60 second
Accuracy	Within 10% of SHUTTER SPEED setting at +20°C to +30°C ambient and +15 VDC within 3%  Within 20% of SHUTTER SPEED setting at 0°C to +50°C and +13.5 VDC to +18 VDC
Relative Aperture (f-number)	1.9, 2.8, 4.0, 5.6, 8, 11, 16
Accuracy	Within 10% of equivalent aperture diameter (APERTURE setting) at 20°C to 30°C ambient and +15 VDC within 3%  Within 20% of equivalent aperture diameter (APERTURE setting) at 0°C to 50°C and +13.5 VDC to +18 VDC
Synchronization	
Maximum Voltage	28 V
Maximum Current	150 mA
Operating Points	Sync switch operates at shutter 50% open and closed points within 3 milliseconds
Contact Bounce	5 milliseconds or less
Contact Resistance	0.1 ohm or less

TABLE 1-3

## OPTICAL CHARACTERISTICS

## C-51 LENS

Characteristic	Performance Requirement
Maximum Relative Aperture at Infinity	f1.2
Focal Length	57.6 mm nominal
Coverage at Maximum Relative Aperture	At least 130.00 mm diameter in object plane
Magnification (Object: Image)	1:0.5 within 5%

TABLE 1-3 (cont)

Characteristic	Performance Requirement
Geometrical Distortion	0.2% or less
Relative Illumination	Illumination at an angle of 20 degrees from optical axis of the lens to be at least 30% of the illumi- nation of the optical axis
Photographic Re- solving Power	
Center Pattern	At least 30 lines/mm
Each Corner Pattern	At least 15 lines/mm

TABLE 1-4

MECHANICAL AND ELECTRICAL  
CHARACTERISTICS

## C-51 SHUTTER (f1.2 LENS)

Characteristic	Performance Requirement
Speed (Normal) Range	4, 2, 1, 1/2, 1/4, 1/8, 1/15, 1/30 and 1/60 second
Accuracy	Within 10% of SHUTTER SPEED setting at +20°C to +30°C ambient and +15 VDC within 3%  Within 20% of SHUTTER SPEED setting at 0°C to +50°C and +13.5 VDC to +18 VDC
Relative Aperture (f-number)	1.2, 1.4, 2.0, 2.8, 4.0, 5.6, 8, 11
Accuracy	Within 10% of equivalent aperture diameter (APERTURE setting) at 20°C to 30°C ambient and +15 VDC within 3%  Within 20% of equivalent aperture diameter (APERTURE setting) at 0°C to 50°C and +13.5 VDC to +18 VDC
Synchronization	
Maximum Voltage	28 V
Maximum Current	150 mA
Operating Points	Sync switch operates at shutter 50% open and closed points within 3 milliseconds
Contact Bounce	5 milliseconds or less
Contact Resistance	0.1 ohm or less

**TABLE 1-5**  
**OPTICAL CHARACTERISTICS**  
**C-52 LENS**

Characteristic	Performance Requirement
Maximum Relative Aperture At Infinity	f1.4
Focal Length	60 mm nominal
Coverage at Maximum Relative Aperture	At least 130.00 mm diameter in object plane
Magnification (Object: Image)	1:1 within 5%
Geometrical Distortion	0.2% or less
Relative Illumination	Illumination at an angle of 25 degrees from optical axis of the lens to be at least 30% of the illumination at the optical axis.
Photographic Resolving Power	
Center Pattern	At least 30 lines/mm
One Corner Pattern	At least 15 lines/mm

**TABLE 1-6**  
**MECHANICAL AND ELECTRICAL CHARACTERISTICS**  
**C-52 SHUTTER (f1.4 LENS)**

Characteristic	Performance Requirement
Speed (Normal) Range	4, 2, 1, 1/2, 1/4, 1/8, 1/15, 1/30 and 1/60 second
Accuracy	Within 10% of SHUTTER SPEED (SEC) setting at +20°C to +30°C ambient and +15 VDC within 3%
	Within 20% of SHUTTER SPEED (SEC) setting at 0°C to +50°C and +13.5 VDC to +18 VDC
Relative Aperture (f-number)	1.4, 2.0, 2.8, 4.0, 5.6, 8, 11, 16
Accuracy	Within 10% of APERTURE (f) setting
Synchronization	
Maximum Voltage	28 V
Maximum Current	150 mA
Operating Points	Sync switch operates at shutter 50% open and closed points within 3 milliseconds
Contact Bounce	5 milliseconds or less
Contact Resistance	0.1 ohm or less

**TABLE 1-7**  
**OPTICAL CHARACTERISTICS**  
**C-53 LENS**

Characteristic	Performance Requirement
Maximum Relative Aperture At Infinity	f1.9
Focal Length	57.6 mm nominal
Coverage at Maximum Relative Aperture	At least 130.00 mm diameter in object plane
Magnification (Object: Image)	1:0.85 within 5%
Geometrical Distortion	0.2% or less
Relative Illumination	Illumination at an angle of 20 degrees from optical axis of the lens to be at least 30% of the illumination at the optical axis.
Photographic Resolving Power	
Center Pattern	At least 30 lines/mm
One Corner Pattern	At least 15 lines/mm

**TABLE 1-8**  
**MECHANICAL AND ELECTRICAL CHARACTERISTICS**  
**C-53 SHUTTER (f1.4 LENS)**

Characteristic	Performance Requirement
Speed (Normal) Range	4, 2, 1, 1/2, 1/4, 1/8, 1/15, 1/30 and 1/60 second
Accuracy	Within 10% of SHUTTER SPEED (SEC) setting at +20°C to +30°C ambient and +15 VDC within 3%  Within 20% of SHUTTER SPEED (SEC) setting at 0°C to +50°C and +13.5 VDC to +18 VDC
Relative Aperture (f-number)	1.9, 2.8, 4.0, 5.6, 8, 11, 16
Accuracy	Within 10% of APERTURE (f) setting
Synchronization	
Maximum Voltage	28 V
Maximum Current	150 mA
Operating Points	Sync switch operates at shutter 50% open and closed points within 3 ms
Contact Bounce	5 ms or less
Contact Resistance	0.1 $\Omega$ or less

TABLE 1-9

## ELECTRICAL CHARACTERISTICS

C-50-SERIES SHUTTER  
ACTUATOR CIRCUIT

Characteristic	Performance Requirement
Power Consumption	
Power Light Off	
Standby	30 $\mu$ A or less at +20°C to +30°C
Shutter Operation	90 mA peak
Focus Operation	550 mA peak; 190 mA steady state
Power Light On	
Standby	60 mA or less at +20° to +30°C
Shutter Operation	130 mA peak
Focus Operation	600 mA peak; 250 mA steady state
Remote Operation	
Switch Resistance	Open: At least 100 k $\Omega$ to ground Closed: 50 $\Omega$ or less to ground
Power Source	+15 VDC within 3% (13.5 to 18 VDC with reduced accuracies)
Shutter Closure Delay	
Bulb Mode Only	Shutter closes 250 ms or less after release of shutter control
Single Sweep Only	Shutter closes 5 s within 20% after sweep ends with + gate applied

TABLE 1-10

## ENVIRONMENTAL CHARACTERISTICS

*The following environmental test limits apply when tested in accordance with the recommended test procedure. This instrument will meet all the performance requirements given in this section following an environmental test. Complete details on environ-*

TABLE 1-10 (cont)

*mental test procedures, including failure criteria, etc., may be obtained from your local Tektronix, Inc., representative or field office.*

## C-50, C-51, C-52, &amp; C-53 CAMERAS

Characteristic	Performance Requirement
Temperature	
Operating	0°C to +50°C
Non-Operating	–40°C to +55°C
Altitude	
Operating	15,000 feet
Non-Operating	50,000 feet and –55°C
Vibration	
Operating (Mounted on an instrument)	15 minutes along each axis at 0.010" within 0.002 (DA). 10 to 55 to 10 c/s in 1-minute sweeps. Three minutes at any resonant point, or if none, at 55 c/s
Shock	
Operating (Mounted on an instrument)	15 g's, 1/2 sine, 11 ms duration, 1 shock in each direction along 3 major axes, total of 6 shocks

TABLE 1-11

## CAMERA ADAPTERS

Tektronix Part No.	Oscilloscope Style <sup>2</sup>
016-0225-03	For oscilloscopes having 5-inch round CRT's.
016-0224-00	For oscilloscopes with 5-inch rectangular CRT's with 8 X 10 cm graticules. Will also fit some TV oscilloscopes. <sup>3</sup>

<sup>2</sup> External power must be supplied to camera except when using camera adapter Tektronix Part No. 016-0249-03 on a 7000-series oscilloscope.

<sup>3</sup> Will not fit the Type 565 and RM565 oscilloscopes. For these oscilloscopes use Tektronix Part No. 016-0225-03.



TABLE 1-11 (cont)

Tektronix Part No.	Oscilloscope Style <sup>2</sup>
016-0223-00	For oscilloscopes with 5-inch rectangular CRT's with 6 X 10 cm graticules.
016-0227-00	For some models of DuMont oscilloscopes. See your local Tektronix Field Engineer or representative.
016-0228-00	For some models of Hewlett-Packard oscilloscopes. See your local Tektronix Field Engineer or representative.

TABLE 1-11 (cont)

Tektronix Part No.	Oscilloscope Style <sup>2</sup>
016-0249-03	For Tektronix Type 601, 602 Display Units, Type 528 Waveform Monitor and 7000-series oscilloscopes <sup>4</sup> .
016-0271-00	For Tektronix Type 576 and 5000-series oscilloscope.

<sup>4</sup> Camera comes equipped with this camera adapter.

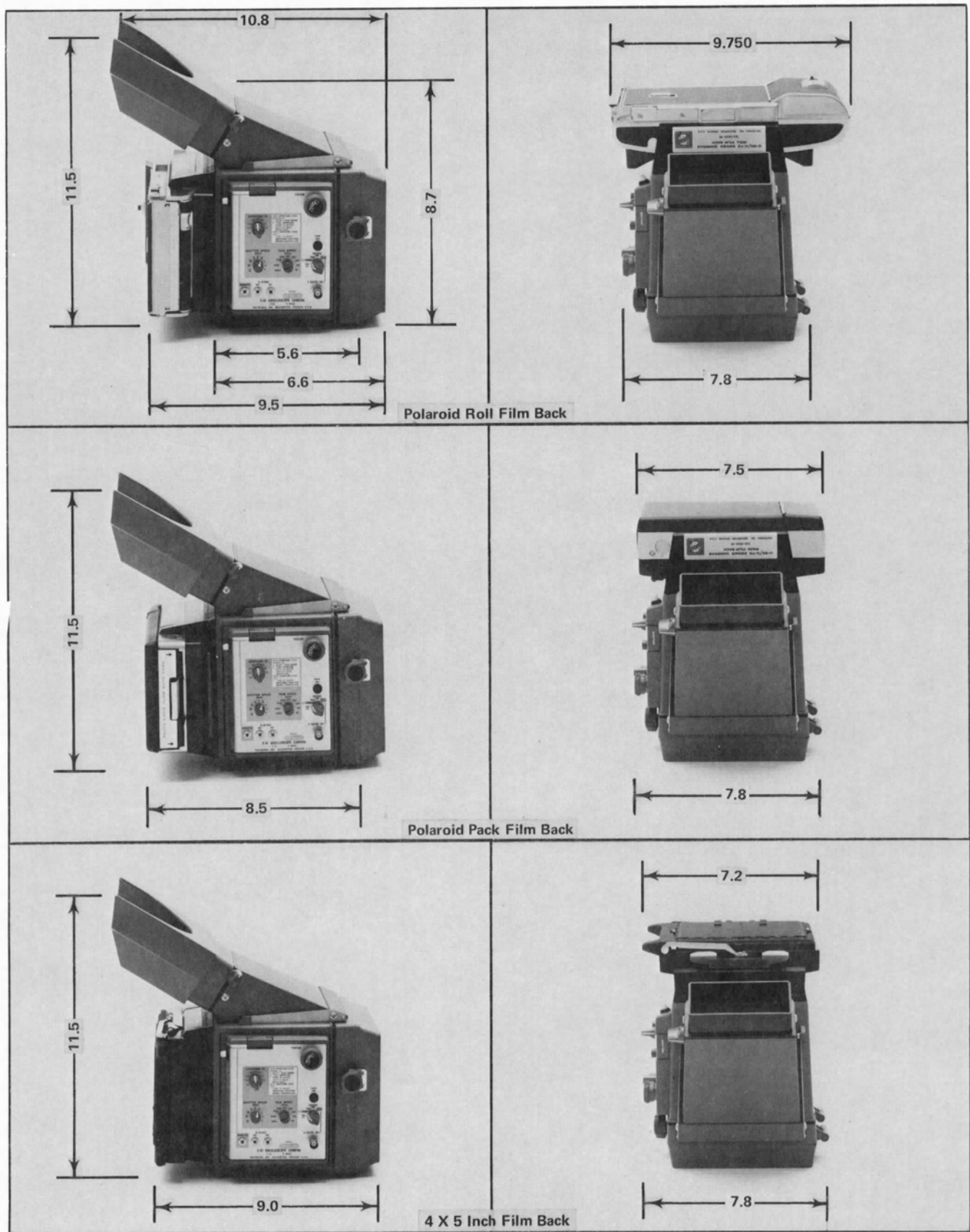


Fig. 1-2. Dimensions of a typical C-50, C-51, C-52, or C-53 Camera.

# SECTION 2

## OPERATING INSTRUCTIONS

### Operating Controls and Connectors (see Fig. 2-1)

#### Phosphor-Matching Filter

A thumb-wheel accessible by reaching in through the front of the camera. It is used to make an approximate visual color match of the photometer spot to the particular phosphor color being used. Four filters are provided: P1, P2, P11, and P31.

#### MODE

A five-position switch that turns camera power on or off and selects NORM (normal), BULB, TIME, or SINGLE SWEEP operation.

#### PWR ON (Indicator Lamp)

Lights when MODE switch is in any position other than PWR OFF to indicate that power is applied to the camera circuitry. (Lamp does not function when Battery Pack is installed and the BAT-INT-EXT switch on the Battery Pack is in BAT position.)

#### + GATE IN

A BNC female connector for applying the + gate signal from the oscilloscope to cause the camera shutter (camera MODE switch must be set to SINGLE SWEEP to obtain this operation) to close after a 5 second delay.

#### FOCUS

A spring-loaded knob that, when pushed in, projects two vertical bars of light on the CRT. By turning the pushed in FOCUS control, the light bars can be aligned, indicating that the camera is properly focused. When the FOCUS control is released, the camera is locked into position and the focusing lamps are turned off.

#### Exposure Control (Contains description of FILM SPEED control, APERTURE control and SHUTTER SPEED indicator)

Selects (in NORM MODE only) the proper shutter speed and aperture combination to match the film speed and the trace brightness as measured by the photometer. To operate, see instructions on the side

of the camera or the First Time Operation instructions later in this section.

#### OPEN (Indicator Lamp)

Lights when shutter blades are open at speeds of 1/2 second or slower. (Lamp does not function when Battery Pack is installed and the BAT-INT-EXT switch on the Battery Pack is in BAT position.)

#### SHUTTER

Triggers the shutter actuator circuit, which in turn actuates a solenoid to open and close the shutter when in NORM (normal) mode; opens the shutter and maintains it open until released when in BULB; opens the shutter when pressed once and closes the shutter when pressed again when in TIME mode; or opens the shutter and provides a reset pulse for resetting the oscilloscope sweep (7000-Series oscilloscopes only) when in SINGLE SWEEP mode (shutter closes 5 seconds after the camera is triggered if a + gate signal from the oscilloscope has been connected to the + GATE IN connector or when the MODE control is moved from the SINGLE SWEEP position).

#### REMOTE

Miniature phone jack for attaching a remote shutter actuate control such as a SPST pushbutton. Accepts miniature phone plug (Tektronix Part No. 134-0079-00).

#### SYNC

Miniature phone jacks for access to NO (normally open) or NC (normally closed) contacts of an internal switch that is actuated by the shutter. Both accept miniature phone plug (Tektronix Part No. 134-0079-00).

Camera Power and Sweep Reset Connector (three pins located in front casting of camera)

A 3-pin connector that mates to a connector on the bezel of a Tektronix 7000-Series oscilloscope for providing +15 volts DC from the oscilloscope to the camera and a sweep reset pulse from the camera to the oscilloscope.

## FIRST-TIME OPERATION

### NOTE

Refer to the end of this section for information concerning *ADJUSTMENT OF FOCUS LAMPS* and *FOCUSING WITH THE FOCUS PLATE*. Batteries are shipped uninstalled, refer to *Battery pack* section following Section 6 for battery installation and replacement information.

The following procedure demonstrates the use of the controls of the C-50, C-51, C-52, or C-53 Camera. Each camera operating mode is described as it would be used on a Tektronix 7000-series oscilloscope. Instructions for mounting and using various parts of the camera will be found later in this section.

### NOTE

If the *SHUTTER* control is operated within 2 1/2 seconds of power removal (other than by turning the *MODE* control to *OFF*), the shutter may open and not reclose. In this case, restore power, then turn the *MODE* control to *PWR OFF* to close the shutter. The camera may then be turned on again.

## Procedure 1 (Set camera *MODE* control to *NORM*)

1. Attach a camera adapter to the oscilloscope.

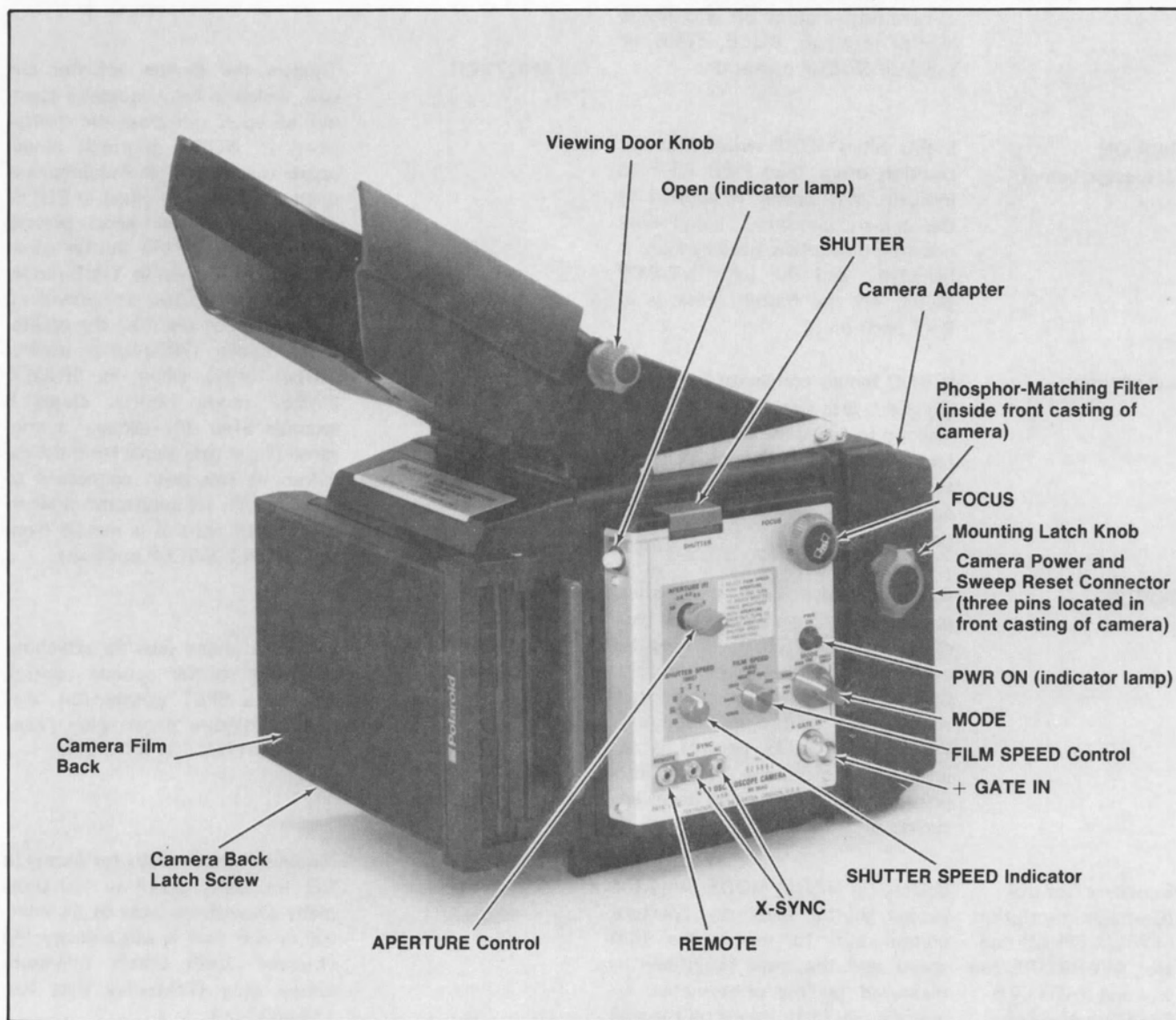


Fig. 2-1. Typical C-50, C-51, C-52 or C-53 Camera showing control and connector locations.



2. Attach the camera to the camera adapter. Obtain the desired display on CRT of the oscilloscope.
3. Set the phosphor-matching filter to match the phosphor of the oscilloscope CRT.
4. Swing the camera against the camera adapter and secure it with the mounting latch knob.
5. Press the FOCUS knob in and adjust it until the two light bars become aligned, then release FOCUS knob.
6. Set the exposure controls as follows:

**CAUTION**

*Limits have been built into the controls to prevent erroneous exposures. If a control reaches a point where it will not turn easily, it has probably hit one of the established limits. Do not force exposure controls.*

- a. Set the FILM SPEED to speed of film being used.
  - b. Set the portion of interest of oscilloscope display to the center of the beam splitting mirror located at the upper center of the viewing tunnel vision area.
  - c. Push APERTURE control in. While observing the beam splitting mirror display, turn the APERTURE control to match spot brightness to CRT trace brightness, or adjust the CRT trace brightness to match spot brightness.
  - d. Release the APERTURE control and select desired SHUTTER SPEED by rotating APERTURE control.
7. Make sure camera back has been loaded with film and that it is ready for the first picture. Then, remove the dark slide from the camera back. Position the oscilloscope display as desired.
  8. Press the SHUTTER control to take a photograph.
  9. Develop the film and check the photograph. If the photograph contrast is not satisfactory, push the APERTURE control in and rotate it or the FILM SPEED control a 30° step or two to correct the exposure.

#### Procedure 2 (Set camera MODE control to BULB)

1. Do steps 1, 2, 4 and 5 of procedure 1.
2. Turn the APERTURE control to the aperture number for exposure desired (exposure control cannot be used for any mode other than NORM).

3. Make sure the camera back has been loaded with film and that it is ready for the first picture. Then, remove the dark slide from camera back.
4. Press and hold SHUTTER control down for the desired time, then release the control to take a photograph.
5. Develop film and check the photograph.

#### Procedure 3 (Set camera MODE control to TIME)

1. Do steps 1, 2, 4 and 5 of procedure 1 and steps 2 and 3 of procedure 2.
2. Press the SHUTTER control once to open shutter and press it a second time after the desired exposure elapse time has occurred.
3. Develop film and check photograph.

#### Procedure 4 (Set camera MODE control to SINGLE SWEEP)

1. Do steps 1, 2, 4, and 5 of procedure 1 and steps 2 and 3 of procedure 2.
2. Connect a BNC coaxial cable between the oscilloscope + gate connector and the + GATE IN connector on the camera.
3. Set the oscilloscope controls for single sweep operation and apply the signal to be photographed.
4. Press the SHUTTER control once then wait for the desired event to occur and sweep the oscilloscope. If the OPEN light is operating (light circuit not turned off) the light will be lit when the SHUTTER control is pressed and be extinguished only after the oscilloscope has been swept and the shutter has been closed by the signal from the oscilloscope.
5. Develop film and check photograph.

### CAMERA ADAPTERS

#### Mounting the Camera (refer below for individual camera adapter mounting information).

A special mounting (camera adapter) is used to attach the camera to the oscilloscope. On some Tektronix oscilloscopes the camera adapter takes the place of the normal graticule cover.

Before mounting the camera adapter onto an oscilloscope it is recommended that any light filter be removed and that the CRT protector plate or external graticule be checked for scratches and cleanliness. If an external grati-



## Operating Instructions—C-50 Series Cameras

cule is used on the oscilloscope it should be placed so that the scribed or marked side is toward the CRT and the clear illumination slots are up.

When mounting a camera adapter onto an oscilloscope, make certain that the hinge fittings on the camera adapter are toward the left side of the instrument. Also, make certain that the camera adapter is securely mounted to the oscilloscope before attaching the camera.

The camera is now attached to the camera adapter by engaging the hinge pins on the camera frame with the hinge fittings on the camera adapter. The camera can be removed at any time by simply lifting it off the camera adapter. The hinge system also permits the camera to be moved against the oscilloscope or swung away.

A mounting latch knob located on the front-right-side of the camera frame is used to secure the camera tightly against the camera adapter. Rotating the mounting latch knob counterclockwise releases the camera from the camera adapter while clockwise rotation tightens the camera against the camera adapter. Before fastening the mounting latch knob, be sure to remove the plastic dust cover from the front opening of the camera frame. Now swing the camera against the camera adapter and tighten it by rotating the mounting latch knob clockwise.

### NOTE

*The camera must be modified if it is to be mounted on a low profile rackmount instrument whose top clearance is restricted. The modification required is removal of the viewing tunnel and the installation of a cover as follows:*

1. Remove two screws located top-front of camera frame which hold viewing tunnel on.
2. Slide viewing tunnel forward and out from camera frame spring clip.
3. Install cover, camera frame top (Tektronix Part No. 200-1041-00) between camera frame and spring clip.
4. Re-install two screws removed in step 1 to secure cover.

*Focusing once the cover is in place must be done with either the 4 X 5 inch film back or a focusing plate (see latest Tektronix catalog for part numbers) in the Polaroid film back since the focusing light bars cannot be seen. The exposure control also cannot be used with the cover in place since the light spot cannot be seen.*

## Mounting Camera Adapter 016-0249-03

Before mounting the camera adapter, locate a slotted rod at the bottom of the camera adapter; using a coin, turn this slotted rod fully counterclockwise.

Slide the camera adapter down over the instrument bezel until the rib on the upper inner part of the camera adapter engages the groove on the top of the instrument bezel. When the camera adapter and the instrument bezel are engaged, push the bottom of the camera adapter in toward the instrument as far as possible. Again using a coin, while holding the bottom of the camera adapter against the instrument, turn the slotted rod at the bottom of the camera adapter clockwise until the camera adapter is held securely to the instrument.

The camera can now be put in place by engaging the hinge pins on the camera frame with the hinge fittings on the camera adapter.

To remove the camera adapter, turn the slotted rod at the bottom of the camera adapter fully counterclockwise. Pull out slightly on the bottom of the camera adapter, then slide the camera adapter up until it is free of the oscilloscope.

## Mounting Camera Adapters 016-0223-00, 061-0224-00, 016-0225-03

### NOTE

*An external power supply must be used to supply power to this camera.*

Remove the graticule cover from the oscilloscope by unscrewing the four knurled nuts. Remove the camera adapter from its package and place it on the four graticule-studs of the oscilloscope. Use the four graticule nuts supplied to attach the camera adapter to the oscilloscope. The new graticule nuts are slotted so that a screwdriver or coin can be used to tighten them.

The camera can now be put in place by engaging the hinge pins on the camera frame with the hinge fittings on the camera adapter.

To remove the camera adapter, reverse the installation procedure.

**Special Information for 016-0224-00 Camera Adapter.**

A hard plastic insert in the camera adapter provides an ambient light seal for a glass-envelope rectangular CRT, but it must be removed before attaching the camera adapter to an oscilloscope using a ceramic-envelope rectangular CRT.

**CAUTION**

*Failure to remove the plastic insert before installing the camera adapter on an oscilloscope using a ceramic envelope CRT can cause dangerous pressure to be exerted against the CRT face plate.*

The plastic insert may be easily removed from the camera adapter by using a small, blunt tool. Viewing the camera adapter from the camera side, insert the tool through the small opening near the center opening in the camera adapter and apply enough pressure to release the ears on the plastic insert.

The plastic insert can be reinstalled into the camera adapter if it is desired to use the camera adapter on a glass-envelope CRT.

**Mounting Camera Adapter 016-0271-00**

**NOTE**

*Camera adapter 016-0271-00 will mount only on a C-50 Camera. It will not mount on any other series camera.*

*The normal focusing method (merging two vertical bars of light) can not be used when using camera adapter 016-0271-00. To focus the C-50 with camera adapter 016-0271-00 use the roll film back focusing plate (Tektronix Part No. 387-0893-01), the pack film back focusing plate (Tektronix Part No. 387-0893-02), or the ground glass screen of the 4 inch X 5 inch film back.*

Install the finger clamp end of the lens assembly over the front lens element of the C-50 camera, pushing it onto the lens as far as possible.

Install the 016-0271-00 camera adapter onto the instrument by sliding the side with the latch lever on the camera adapter down over the instrument bezel until the rib on the upper inner part of the camera adapter engages the groove on the top of the instrument bezel. When the camera adapter and the instrument bezel are engaged, push the bottom of the camera adapter in toward the instrument until a click is heard, indicating that the bottom latch of the camera adapter has engaged the instrument bezel. Connect the camera adapter pigtail connector to the instrument camera power connector.

Mount the C-50 camera to the 016-0271-00 camera adapter by using the camera adapter 016-0249-03. Instructions for mounting and removing the camera adapter

016-0249-03 are contained in section 2 of the instruction manual.

Remove the special lens assembly by gently rocking it outward from the lens element.

Remove camera adapter 016-0271-00 by disconnecting the pigtail connector from the instrument, then lift out on the release latch lever at the bottom of the camera adapter while pulling out slightly on the bottom of the camera adapter. Slide the camera adapter up until it is free of the instrument.

**CAMERA FILM BACKS**

**Mounting the Camera Back**

Slide the front of the camera back down over the rear projection of the camera frame until the rib on the upper inner part of the camera back engages the groove on the top of the camera frame. When the camera back and the camera frame are engaged, push the bottom of the camera back in toward the camera frame until a click is heard, indicating that the bottom latch of the camera back has engaged the camera frame. Then, screw the camera back latch screw in as far as possible. Check that the camera back is securely attached by pulling out on it gently after it is mounted.

To remove the camera back, unscrew the camera back latch screw until it is possible to lift the bottom of the camera back out slightly from the camera frame. Then, slide the camera back up until it is free of the camera frame.

**Selecting the Camera Back**

The choice of a camera back will depend primarily on the intended use for the photograph, how quickly you want the finished photograph, how large an area you wish to photograph, the magnification factor of the particular lens used, and the size of the negative desired. If you want to obtain a negative from which a number of prints can be made, either Types 55 P/N film (which comes in Polaroid Land 4 X 5 only) or conventional film is quite satisfactory. Both the Polaroid Land 4 X 5 film holder and the holders for conventional cut and roll film are used with the 4 inch X 5 inch film back in place.

With either Polaroid Land or conventional films, the size of the film used by the selected back must be at least as large as the image from the lens. This will depend on the object-to-image ratio of the camera lens and on the size of the oscilloscope display. For example, the roll film back for 120 or 620 film could be used with a 1:0.7 lens and a 10-cm wide oscilloscope display. This is because the image of the display is 7 centimeters wide and the long dimension of the film is about 8.25 centimeters. Thus, there is 1.25 centimeters of film area to safe-guard against any image cut off on the photograph.

In actual practice, the film size should be at least 5 mm larger than the size of the image to allow for normal toler-

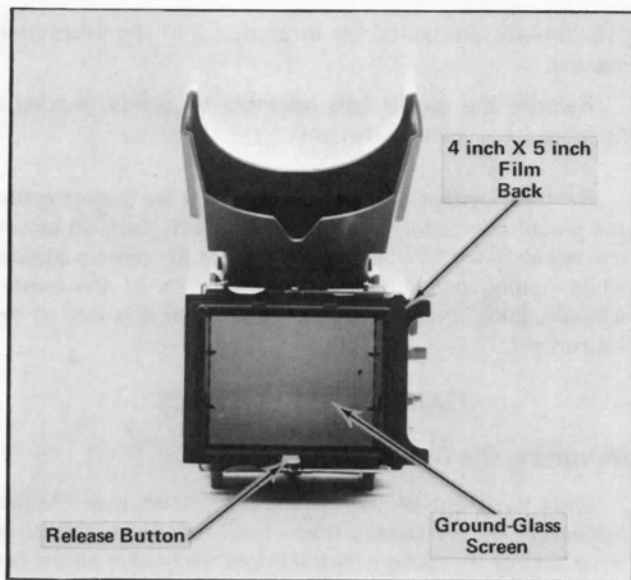


Fig. 2-2. The 4 inch X 5 inch Film Back installed to permit focusing.

ances in the construction of the camera backs and for the position of the film in the back.

### 4 X 5 INCH FILM BACK

#### Focusing With a 4 inch X 5 inch Film Back

If for some reason it is desired to focus the camera using the 4 inch X 5 inch film back it can be done by:

1. Obtain a sharply focused trace on the CRT using the oscilloscope Focus and Astigmatism controls.
2. Secure the camera in place on the oscilloscope.
3. Install the 4 inch X 5 inch film back onto the camera and press the release button on the 4 inch X 5 inch film back, See Fig. 2-2.
4. Press in the APERTURE knob and set it to the smallest number, then release the knob.

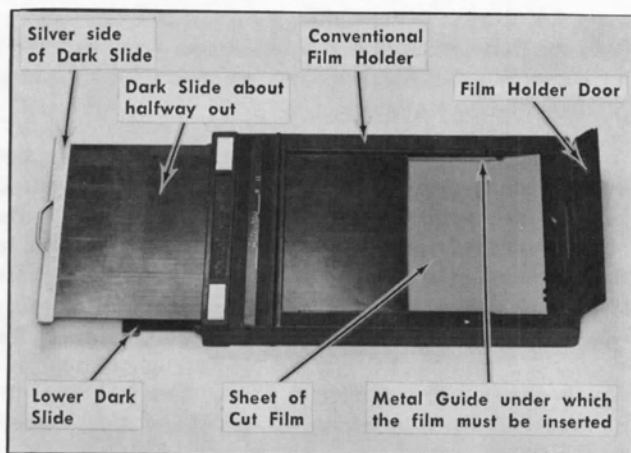


Fig. 2-3. Important points of film holder.

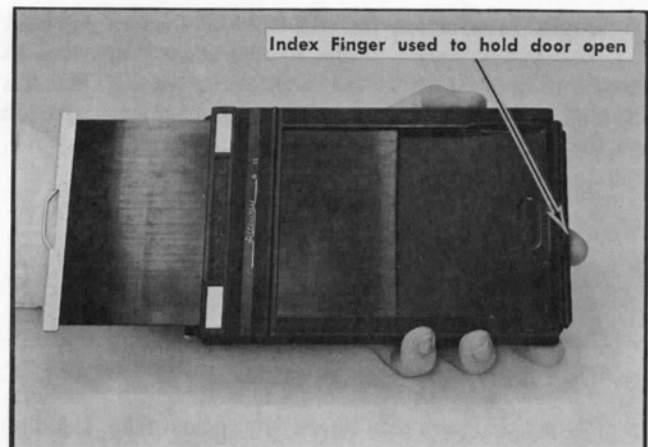


Fig. 2-4. Method used to hold film holder while loading the film.

5. Set the MODE knob to T and press the SHUTTER RELEASE button once to open the shutter.
6. Observe the image on the ground glass screen of the 4 inch X 5 inch film back.
7. Push in the FOCUS knob and change the focus as desired, then release the knob.
8. Press the SHUTTER RELEASE button a second time to close the shutter.

When an oscilloscope has an external graticule, the camera is normally focused on the oscilloscope trace, rather than the external graticule, since it is usually most desirable to photograph the fine detail of the trace. Even with the camera focused on the oscilloscope trace, the focus of the external graticule will usually be quite satisfactory. The camera can, of course, be focused on the external graticule if desired.

### CONVENTIONAL FILM HOLDERS

#### Loading the Sheet Film Holder

Sheet film is available in a variety of types. Some types

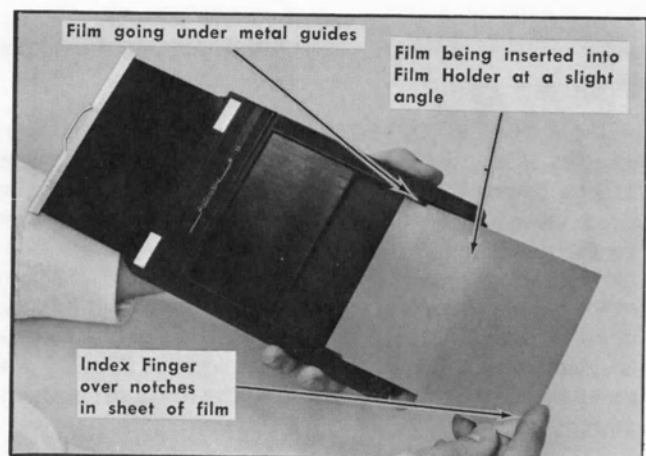


Fig. 2-5. Proper way to insert the film into the film holder. Note the position of the right index finger on the sheet of film.



of film require that the film holders be loaded in complete darkness while others permit the use of a safe light. See the instruction sheet with the film; it will state whether a safe light can be used or not.

In loading the film holder, the dark slide (see Fig. 2-3) should be pulled out about half way. Place the silver side of the dark slide handle, on the empty film holder to be loaded, towards the closest outside surface. Later, when the sheet of film has been exposed, turn the slide over so that the back side of the handle faces the outside when it is re-installed.

The following procedure should be practiced several times outside the darkroom before attempting to load the film holders in the dark.

Set the lighting conditions of the darkroom as described in the information sheet which came with the film. Now hold the film holder in your left hand with the side which is to be loaded up and the dark slide toward your body. The index finger of the left hand is used to hold the film holder door open. Refer to Fig. 2-4 for the method used.

With the right hand, hold the film so that the notches in the edge of the film are in the upper right corner. Fig. 2-5 shows the proper way to hold the film. In Fig. 2-5 it should be noted that the index finger of the right hand is resting on the notches in the film.

The film is inserted at a slight downward angle into the holder. In Fig. 2-5 it can be seen how the film must be inserted under the two metal guides inside the film holder. After the film is started under the metal guides, it should be shoved all the way forward in the holder (toward the body). If the film is not shoved all the way forward, the complete image may not appear on the film.

When the film is inserted into the holder, the far end of the film should be given a flick (Fig. 2-6) with the index finger of the right hand. This will indicate whether the film is under the film holder guides or not. Now that the film is properly installed in the film holder, the film holder door may be closed.

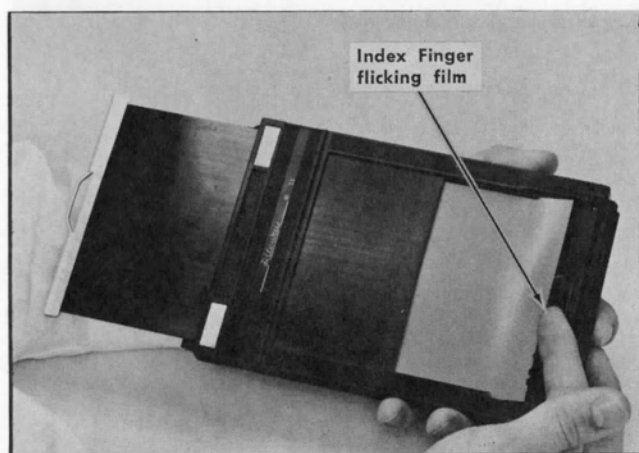


Fig. 2-6. Checking the sheet of film to insure that it has been inserted under the metal guides of the film holder.



Fig. 2-7. Closing the film holder after loading the sheet of film. The film holder door is held closed with thumb while dark slide is installed.

Release the index finger of the left hand from holding the door open, and with the right thumb close and hold the door in the closed position (see Fig. 2-7). Push the slide all the way into the holder (toward the film door). The dark slide will fit into a slot in the film holder door when it is shoved all the way into the holder. One side of the film holder is now loaded. The film holder door will remain closed by itself once the dark slide has been inserted all the way.

The dark slide may now be locked in place by turning the right angle pin located on the end of the film holder toward your body.

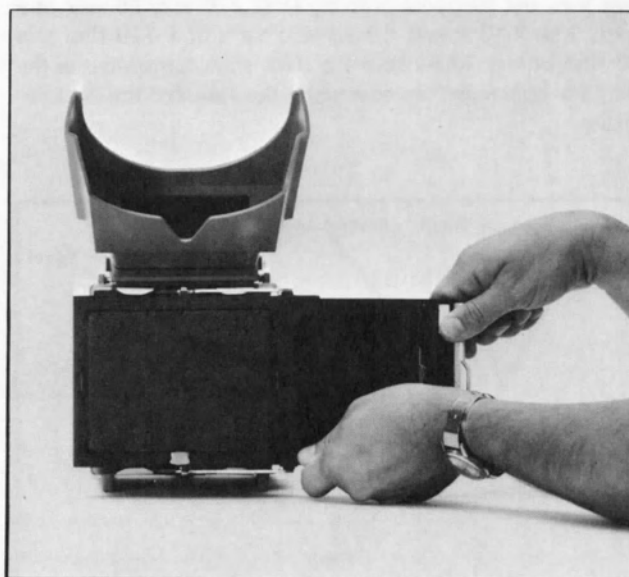


Fig. 2-8. Inserting the film holder in the 4 inch X 5 inch film back.

## Procedure Used to Expose Sheet Film

Obtain the desired waveform on the oscilloscope. With the Focus and Astigmatism controls, focus the display. The camera should now be attached to the oscilloscope and the 4 inch X 5 inch film back attached to the camera. Check that the camera is properly focused.

Now, with one hand take the film holder; with your free hand lift the hinged focusing panel on the 4 inch X 5 inch film back (see Fig. 2-8). Insert the film holder between the hinged focusing panel and the other part of the 4 inch X 5 inch back. The side of the film holder to be exposed should be installed toward the camera lens.

The film holder should be shoved firmly all the way into the 4 inch X 5 inch film back until the small ridge on the film holder is seated in the 4 inch X 5 inch film back. Test to see that the film holder is seated by giving it a slight tug.

Set the camera controls for the correct exposure. Remove the dark slide from the side of the film holder facing the lens. Expose the film and replace the dark slide in the film holder so that the black side of the handle is toward the camera lens. The black side of the dark slide toward the nearest outside edge of the film holder indicates exposed film.

To remove the film holder from the 4 inch X 5 inch film back, the hinged focusing panel must be lifted away from the camera slightly. With the hinged focusing panel lifted, take hold of the film holder, lift it slightly and pull outward.

To remove the sheet film from the film holder, reverse the loading procedure as described above.

## Loading the Roll Film Holder

If the directions for loading the roll film holder have been lost, the sectional drawing (Fig. 2-9) may be used as a guide. Fig. 2-10 shows the various parts of a 120 film size roll film holder. Make sure the dark slide is installed in the roll film holder before advancing the film for the first exposure.

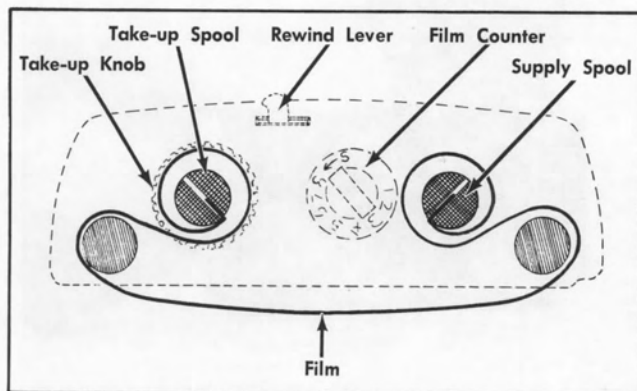


Fig. 2-9. Film threading path for a typical roll film holder.

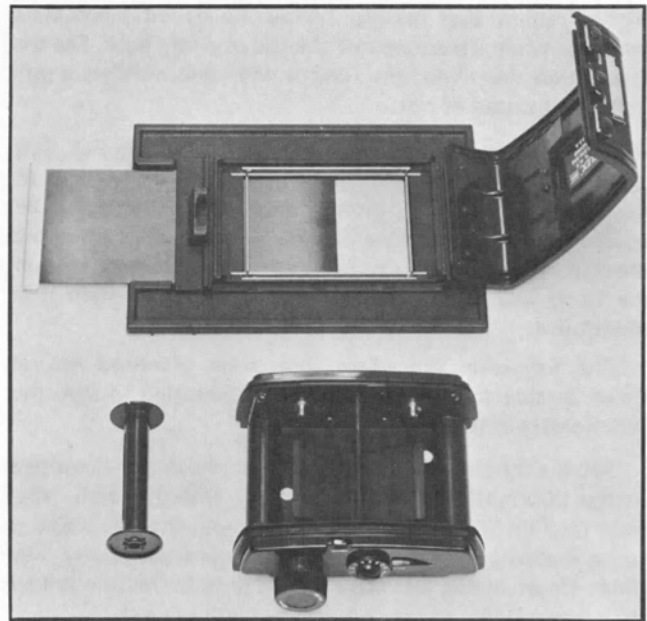


Fig. 2-10. Typical Roll Film Holder apart, ready to load film.

## Attaching the Roll Film Holder to the 4 inch X 5 inch Film Back

The roll film holder should be loaded before installing it on the 4 inch X 5 inch film back. After the roll film holder is loaded and the film advanced to the first exposure (dark slide still installed), it can be laid aside.

Place one thumb on each of the hinges for the hinged focusing panel (refer to Fig. 2-11). Press the hinges in toward the oscilloscope, and at the same time, slide the hinged focusing panel toward the side in which the film

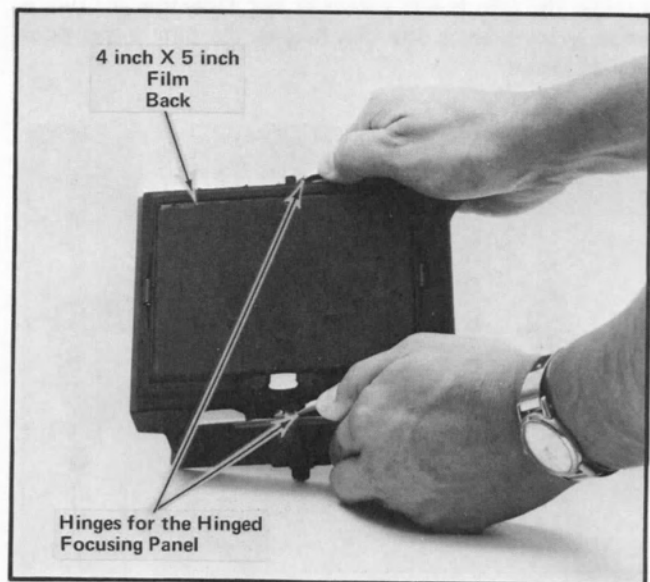


Fig. 2-11. Method used to remove the Hinged Focusing Panel.



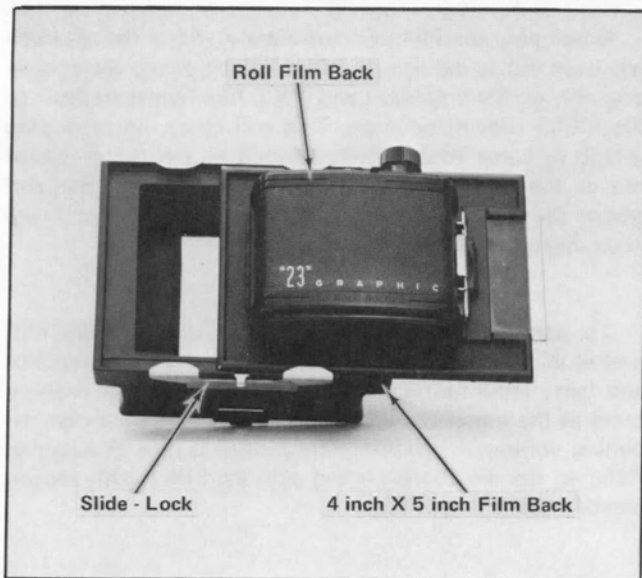


Fig. 2-12. Installing the roll film back on the 4 inch X 5 inch film back.

holder would be inserted. The above procedure will remove the hinged focusing panel from the 4 inch X 5 inch film back.

Slide the roll film holder under the slide locks and onto the 4 inch X 5 inch film back. Slide the roll film holder completely under the slide locks to insure a light-tight seal and a secure fit. The small ridge on the roll film holder should fit into the slot in the 4 inch X 5 inch film back. This is the same type of locking used on the sheet film holders.

One slide lock is located on each side of the long axis of the film (see Fig. 2-12).

### Exposing Roll Film

Obtain the waveform on the oscilloscope and focus it properly. Check that the camera is still properly focused, then set the camera controls for the correct exposure. Remove the dark slide from the roll film holder and take the picture.

To advance the film, press the film release lever and turn the knob until it stops. The roll film holder is now ready for the next exposure.

### MODELS 500 and 545 POLAROID LAND 4 X 5 FILM HOLDERS

#### Attaching the Polaroid Land 4 X 5 Film Holder to the 4 inch X 5 inch Film Back

Install the camera on the oscilloscope to be used and attach the 4 inch X 5 inch film back to the camera. The waveform should now be obtained and focused properly with the oscilloscope controls. The camera focus should be checked before proceeding.

To insert the film holder in the 4 inch X 5 inch film back, lift the hinged focusing panel and slide the film holder between the hinged focusing panel and the rest of the 4 inch X 5 inch film back. The film holder should be inserted so that the processing arm is facing away from the lens (see Fig. 2-13).

When the film holder has been shoved all the way into the back, give a small tug outward to see if the unit is firmly locked in the 4 inch X 5 inch film back. There is a small ridge on the holder which will engage in a slot in the 4 inch X 5 inch film back. The film holder is automatically held securely in place by the slide locks engaging the slots in the film holder (refer to Fig. 2-13).

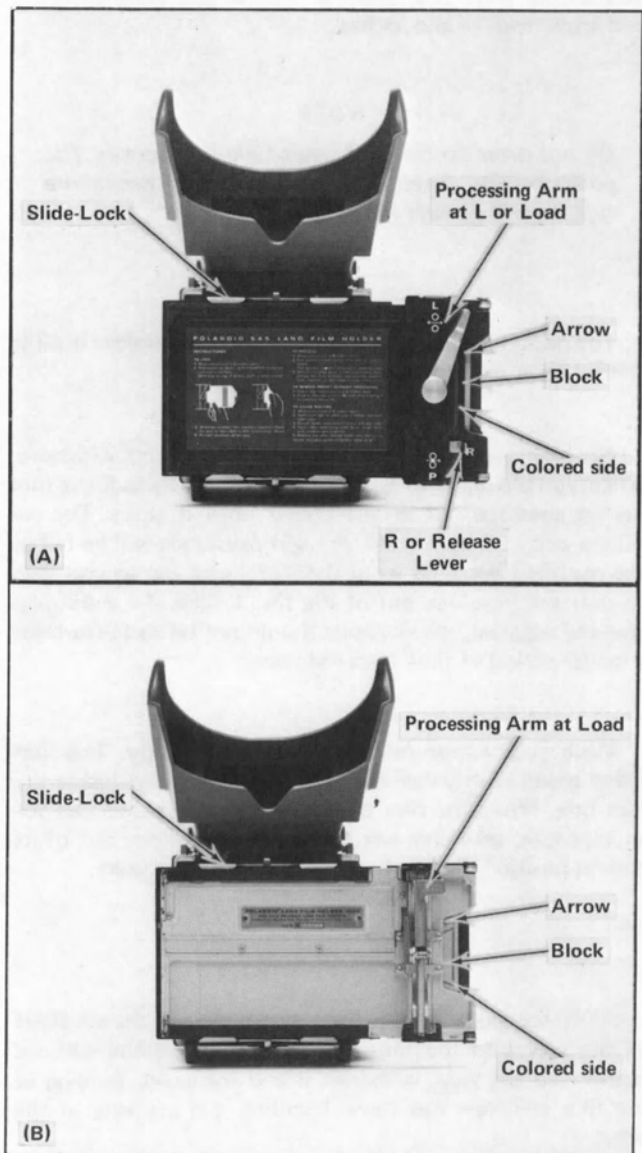


Fig. 2-13. (A) Model 545 Polaroid Land 4 X 5 film holder. (B) Model 500 Polaroid Land 4 X 5 film holder. Both film holders are shown properly installed in the 4 inch X 5 inch film back. With the film packet properly installed, it should be as shown.

## Inserting and Exposing the Polaroid Land 4 X 5 Film Packet

When inserting the film packet, the processing arm on the Polaroid Land film holder must be in the L or LOAD (up) position. Before inserting, check the film packet for proper side toward the lens.

Hold the film packet about its center and insert the metal-capped end into the holder. Push the film packet gently (without buckling) into the film holder. After the metal-capped end has been pushed past the rubber roller, you should shift your hold to the far end (colored block and arrow end) of the packet.

### NOTE

*Do not press on the pod area of the film packet. The pod contains developing chemicals and premature rupture will damage the picture.*

The packet should be pushed into the film holder until it stops. (Refer to Fig. 2-13.)

Now set the camera controls for the correct exposure. When you are ready to take the picture, gently pull the film packet envelope out of the holder until it stops. The envelope acts as a dark slide. A slight resistance will be felt as the envelope detaches from the metal end cap as you start to pull the envelope out of the film holder. To avoid fogging the negative, the envelope should not be withdrawn for a longer period of time than necessary.

Make your exposure as you would normally. The film speed along with other directions will be found inside the film box. When the film packet envelope is pulled out for an exposure, take care not to bend the envelope out of its natural position. Such a bend could cause light leaks.

After the exposure has been made, reinsert the envelope all the way into the film holder. If the envelope will not reinsert all the way, withdraw it and try again. Forcing of the film envelope can cause buckling and creasing of the print.

The picture may now be developed right away or at a later time. If ambient humidity is high, development should not be delayed.

## Developing the Film Packet

**Developing the Picture Immediately.** After the envelope has been reinserted into the film holder, swing the processing arm on the Polaroid Land 4 X 5 film holder to the P or PROCESS (down) position. This will cause the processing rollers to come together. Now when you pull the packet out of the film holder, the rollers will crush the pod and spread the developing reagent between the positive and negative sheets inside the packet.

To start development of the film packet, pull the film packet all the way out of the film holder with a confident and fairly rapid motion. A slight resistance will be encountered as the metal cap enters the rollers, but keep right on pulling without hesitation. The picture is now developing. Refer to the directions packed with the film for the recommended development time.

Extremes of pulling speed should be avoided in pulling the film packet out of the film holder to start development. A slow, inching pull may cause mottle or streaks to appear on the print, while too fast a pull may result in an uneven spread of the developing reagent.

Care should be taken to prevent the film packet from bending or buckling during the development time. If possible, the film packet should be laid on a flat surface. Once the film packet has been pulled out to start development, the processing arm should be left in the P or PROCESS (down) position until it is desired to insert another film packet into the film holder.

**Removing the Finished Picture.** After the recommended development time, remove the envelope of the film packet, following the instructions given with the film.

Peel the picture away from the negative. For all Polaroid Land film types except Type 55 P/N, take the white sheet in one hand, the brown paper and negative in the other, and peel them apart rapidly. For Type 55 P/N Polaroid Land film, take the white sheet and brown paper in one hand, the negative in the other, and peel them apart rapidly. Do not let the print fall back on the damp negative. Black-white pictures should be coated as soon as possible, using print coaters supplied with each box of packets. Follow coating instructions found on the instruction sheet in the film box.

If the Type 55 P/N Polaroid Land film has been used, the brown paper should be removed from the white sheet

(print) as soon as possible. From the negative remove the remainder of the envelope. The negative is perforated at the metal cap to aid in separating the envelope from the negative. The negative must now be washed in water or a solution of sodium sulfite and then dried. Refer to the instruction sheet in the film box for complete directions.

### Removing Exposed Film Packets For Later Development

Occasionally you may want to expose a series of pictures without developing each one right away. Expose the negative and reinsert the envelope all the way, making sure the processing arm is in the L or LOAD (up) position.

**Model 545 film holder.** Push the R or release lever, located near the P or PROCESS position of the processing arm, in as far as possible and hold it in. Carefully withdraw the entire film packet from the film holder. Do not let go of the release lever until the film packet is completely out of the film holder.

**Model 500 film holder.** Push the release lever on the far end of the film holder (end away from loading end) as far down as it will go (about 3/8 inch) and hold it down. Briskly pull the film packet out of the film holder. Do not let go of the release lever until the film packet is completely out of the film holder.

To identify the exposed but unprocessed packets, bend over one corner (away from the metal cap). This will prevent mix-ups when shooting fast.

**Developing Exposed Film Packets at a Later Time.** With the processing arm in the LOAD (up) position, insert the exposed packet into the film holder as described previously. Make sure the packet is fully inserted into the film holder. Swing the processing arm to the P or PROCESS (down) position and proceed to develop your pictures in the manner outlined above.

## POLAROID LAND ROLL FILM BACK

### Loading and Exposing the Roll Film Back

When a new box of film is opened, the instruction sheet and print coater, if there is one, should be saved.

To open the roll film back for loading, swing the latch lever out and down toward the bottom of the roll film

back. The roll film back should have opened slightly. Swing the back cover out until it is fully open. Inside the roll film back you will now see the inner panel. Swing the inner panel to its fully opened position.

Remove the empty spool from the roll film back. The processing rollers in the film back should be inspected and cleaned if necessary. A damp cloth may be used to clean the rollers. It is important to keep these rollers clean to spread the developer evenly between the negative and positive components of the film.

In the following procedure it is assumed that the roll film back is lying face down on a table, with the dark slide protruding from the right side (tripod socket hole toward you).

Remove the film rolls from the foil wrapper by tearing the wrapper at the indicated point. Break the first seal at the end of the roll. The film actually contains two rolls: a large white positive roll, and a smaller spooled negative roll. When you unwrap the film, be careful not to break the seals on the top of the negative roll and the underside of the positive roll. Drop the rolls into the wells in the camera back as shown in Fig. 2-14.

Now close the inner panel, bringing the film leader around the steel roller on the edge of the inner panel. Lay the leader flat between the guides at the outer edge of the panel (see Fig. 2-15). Be sure that the white paper of the positive roll lies smooth and flat, not tucked into the well.

Close the back cover, and squeezing it tightly shut, pick up the roll film back. Swing the latch lever all the way towards the bottom of the film back. This will insure that both sides of the back cover will latch. Now swing the latch lever to the locked position (towards the top of the roll

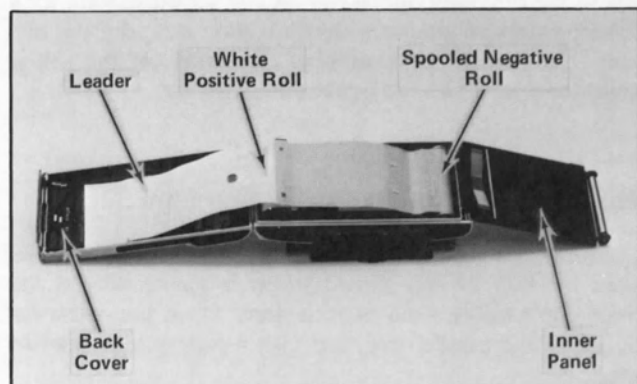


Fig. 2-14. The Polaroid Roll Film Back opened for loading. The white positive roll is dropped in the well at the left while the spooled negative roll is dropped in the well at the right.



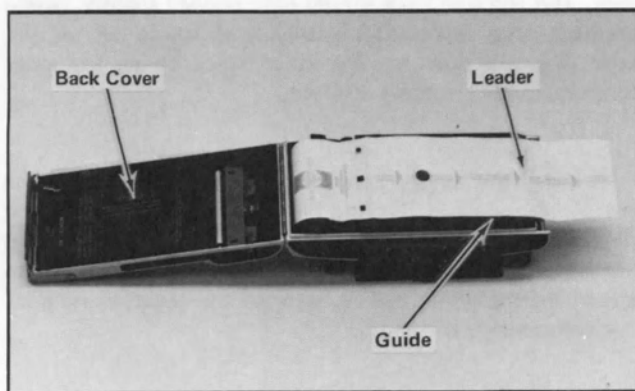


Fig. 2-15. The leader of the film roll must be brought around the roller on the inner panel. Care must be taken that the leader is aligned between the guides on the inner panel before the roll film back is closed.

film back). There should now be a short tab of paper extending beyond the cutter bar of the film back. The dark slide should now be installed in the film back. If it is not, the first picture may be exposed.

While holding the roll film back with your left hand, lift the cutter bar with your right hand. The cutter bar is lifted by raising up on the plastic edge. Once the cutter bar has been lifted it will remain in the up or unlocked position until it is pushed down. Pull the film leader out of the camera back until it comes to a firm stop. About 15 inches of film leader must be pulled out before it will stop, but this will occur automatically when the film is in the proper position for the first exposure.

Lock the cutter bar with a gentle downward pressure. After it has latched you can tear the film leader off and discard it.

The roll film back is now ready for the first picture. Mount the film back on the camera and set the camera for a correct exposure. Remove the dark slide and take the picture. The number of exposures remaining on the roll is indicated on the film tab under the cutter bar.

### Advancing and Developing the Roll Film

Throw the red release switch in either direction to release the film. If you should throw it accidentally at any time, don't worry — no harm is done. Open the cutter bar by lifting the plastic edge, and take a firm grip on the film tab.

Pull the film tab straight out about 7 inches with a single motion. Pull it about as hard and rapidly as you might pull

down a window shade; not hard enough to pull the shade off the roll (or the film off the spool), but not slowly and hesitantly. Remember the film will stop automatically.

#### NOTE

*If the film tab will not pull easily, throw the red release switch again.*

After you pull the film tab, press down and latch the cutter bar. Tear off and discard the excess paper.

Wait the recommended development time. Pulling the film tab has started the development process and advanced the film into position for the next picture. Follow the instructions in the instruction sheet for development times under various conditions. It is important for you to check the instruction sheet for exact development time. This time varies for different types of film, and even the development time for a particular film may change.

When the development time is up, slide back the latch on the print door and open the door. Lift the print out carefully, starting with the cutout. Don't let the print fall back on the damp negative. Then close and relatch the print door.

Those black-and-white prints that require coating should be coated as soon as possible. First remove the curl by drawing the print face up over a straight edge such as the edge of the cutter bar.

Apply the print coater along the entire length of the print, including edges, borders, and corners, with 6 to 8 firm, overlapping strokes. For the last two or three pictures in each roll press the coater down hard against the tap end of the print (not the image) for a moment to release extra liquid; then spread the liquid smoothly across the print.

## POLAROID LAND PACK FILM CAMERA BACK

### Loading and Exposing the Polaroid Land Film Pack

When the film box is opened, the instruction sheet and print coater, if there is one, should be saved.

To open the pack film back for loading, push the latch lever (on the bottom of the film back near the tripod socket), counterclockwise, see Fig. 2-16. The door should have opened slightly. Now swing the door out until it is fully open.

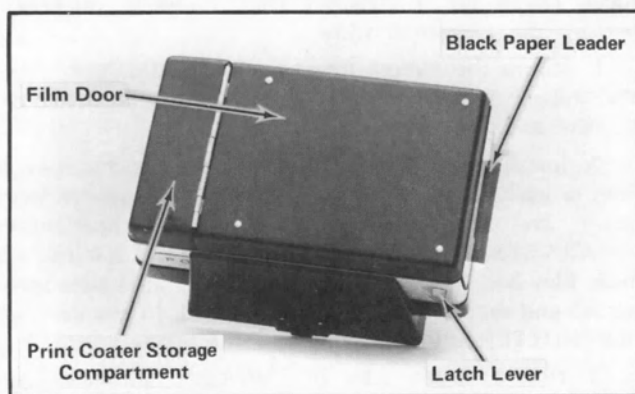


Fig. 2-16. Polaroid Land Pack Film Back.

Remove the empty film container from the film back by lifting up and pulling it out from under the door hinge.

The processing rollers in the pack film back should be inspected and cleaned if necessary. Directions inside the door indicate how to release the stainless steel rollers from their normal position in the film back. A damp cloth may be used to clean the rollers. It is important to keep these rollers clean to spread the developing reagent evenly.

In the following procedure it is assumed that the film back is lying face down on a table, with the dark slide protruding from the right side (tripod socket toward you).

Remove the film pack from the foil wrapper by tearing the wrapper at the indicated point. When you unwrap the film, be careful to handle the film pack by the edges only.

Insert the film pack under the back door hinge, and push it toward the hinge and down into the film plane until it snaps into place, see Fig. 2-17. Be sure that the indicated

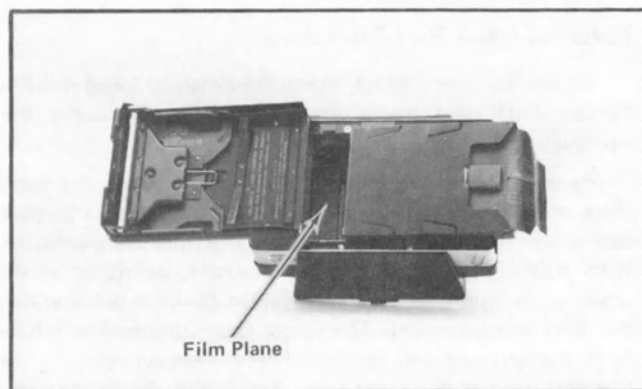


Fig. 2-17. Installing Film Pack into Pack Film Back.

side of the film pack is correctly oriented toward the lens, or the dark slide in this case. The black paper leader should be allowed to hang over the right end of the pack film back.

Close the door by squeezing it until both sides snap shut. Make sure the black paper leader is now extending outside the pack film back. The dark slide should be pushed in all the way.

While holding the pack film back with your left hand, pull the black paper leader all the way out. The film back is now ready for the first picture. If the dark slide has not been pushed in all the way, the first exposure may be fogged.

Mount the pack film back on the camera and set the camera for a correct exposure. Remove the dark slide and take the picture. The number of the negative ready for exposure is indicated on the white tab protruding from the camera back.

### Advancing and Developing the Film

After taking the picture, pull the white tab, (Fig. 2-18) which extends from the camera back, all the way out. Pulling the white tab does two things: first, it positions the positive and negative sheets together; and second, it causes the yellow tab (marked PULL) to pop out.

#### NOTE

*Do not pull another white tab if a yellow tab is extending from the pack film back. The white tab should be the only tab visible when it is pulled.*

Next pull the yellow tab (Fig. 2-18). This causes the positive and negative sheets to be pulled between and through the processing rollers, spreading the developing reagent between the two sheets to start the development process.

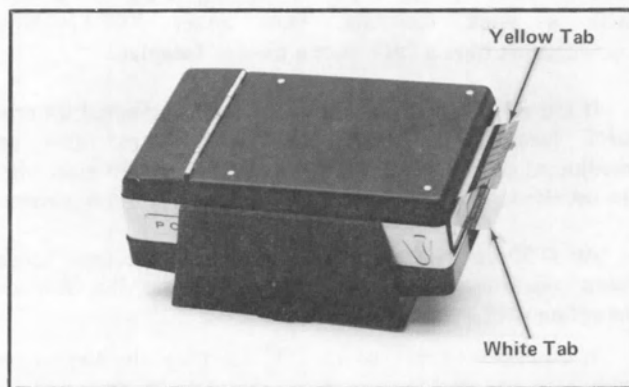


Fig. 2-18. Positive and negative sheets ready to be pulled out of pack film back.



Pull the yellow tab completely out of the camera back in one smooth, fairly rapid motion. Pull about as hard and rapidly as you might pull a window shade; not slowly and hesitantly.

Wait the recommended development time. Follow the directions in the instruction sheet for development times under various conditions. It is important for you to check the instruction sheet for exact development time. This time varies for different types of film, and even the development time for a particular film is subject to change.

When the development time is up, peel the print away from the negative rapidly. Do not let the print fall back on the damp negative.

Those black-and-white prints that require coating should be coated as soon as possible after separating them from the negatives. Prints may be coated by sticking the back of the print to a sticky area to hold them, then using the Polaroid print coater.

Apply the print coater along the entire length of the print, including edges, borders and corners, with 6 to 8 firm overlapping strokes. For the last two or three pictures in each film pack, press the coater down hard against a non-image surface for a moment to release extra liquid; then spread the liquid smoothly across the print as before.

### Storage of Print Coater

The print coater can be stored in the compartment (Fig. 2-16) just to the left of the film loading door (bottom of camera back towards you). To open this compartment, grasp the black cover area to the left of the hinge and lift up. If the compartment is difficult to open, pry with your fingernails between the black cover and the aluminum casting on the left side of the body.

### ADJUSTMENT OF FOCUS LAMPS

Cathode Ray Tubes used in TEKTRONIX oscilloscopes adaptable for use with the C-50 series cameras have two different faceplate thicknesses. The 7904 and the display unit (D7704) for the 7704A oscilloscopes contain a CRT with a thick faceplate. Most other TEKTRONIX oscilloscopes have a CRT with a thinner faceplate.

If the C-50 series have the focus lamps adjusted for one CRT faceplate thickness, the focus lamps must be readjusted to allow optimum focus settings when used with an oscilloscope having a different CRT faceplate thickness.

All C-50 cameras are factory adjusted for correct focus lamp operation with oscilloscopes having the thinner faceplate CRT.

If you are uncertain which CRT faceplate thickness your camera is adjusted for, or of the faceplate thickness of the CRT in your oscilloscope, or if you wish to readjust the

focus lamps for a different CRT faceplate thickness, perform the steps listed below.

1. Mount the camera frame on the oscilloscope, using the proper adapter (refer to this manual for information on adapters and camera mounting).

2. Install the camera back on the camera frame. If a roll film or pack film back is used, select the appropriate focus plate, and install it according to the instructions "FOCUSING WITH THE FOCUS PLATE". If a 4 inch x 5 inch film back is used, it has a built-in ground glass focus screen and the focus plate is not required. In any case, set the SHUTTER SPEED selector to T (time).

3. With a visible trace or illuminated graticule lines, adjust the FOCUS knob to obtain optimum focus on the focus plate (or ground glass plate in the 4 inch x 5 inch back).

4. Remove the focus plate from the camera back (roll or pack film backs only) and remove the camera back from the camera frame.

5. Observe the cluster of three small RHS screws that secures each focus lamp assembly to the camera frame near the right and left walls and slightly below the lens assembly, these clusters of screws may be viewed through the cutouts in the plate near the right and left frame walls.

6. Without rotating the FOCUS knob, press in on the knob to actuate the focus lamps. Observe the two vertical bars of light on the CRT screen. If the two bars are not aligned one directly above the other, and positioned horizontally within about two centimeters of the center of the CRT screen, select the proper size screwdriver and adjust one or both clusters of screws to align the bars of light with each other while keeping them relatively vertical and within about two centimeters of the center of the horizontal axis of the screen.

7. The focus lamps for your camera should now be in correct adjustment to allow correct focus when used with any TEKTRONIX oscilloscope having the same faceplate thickness. If you desire to use the camera with an oscilloscope having a different faceplate thickness, repeat the foregoing procedure.

### FOCUSING WITH THE FOCUS PLATE

#### Polaroid Land Roll Film Back

To use the focus plate, open the Polaroid Land roll film camera back and insert the focus plate where the film normally rests.

To accomplish this place the frosted side of the focus plate toward the camera lens and insert the two bottom ears inside the edge of the camera-back film compartment. With nothing more than finger pressure, gently press the upper mounting ears all the way into the film plane within the film compartment. The upper mounting ears will have to be compressed and the focus plate inserted into the film compartment at the same time. Fig. 2-19A shows the focus plate properly installed.

For best trace detail, focus the camera on the oscilloscope trace (the focus of the external graticule will usually be satisfactory). If less trace detail can be tolerated, the camera can be focused on the external graticule if desired.

Set the Lens for maximum aperture and the SHUTTER SPEED selector to T (time). Obtain a sharply focused trace on the CRT, then secure the camera against the oscilloscope. Open the camera shutter and observe the trace on the focus plate. When the split image focus plate (TEKTRONIX Part No. 387-0893-01) is used, observe the horizontal trace or graticule line in the center of the clear bi-prism spot. Adjust the Focus knob on the camera until the horizontal trace or graticule line is aligned with itself (see Fig. 2-19C). If a focus plate without the split image is used, adjust the Focus knob for a sharply focused trace or graticule line on the focus plate.

### Polaroid Land Pack Film Back

To use the focus plate, open the Polaroid Land pack film camera back and insert the focus plate where the film normally rests. To accomplish this, place the frosted side of the focus plate toward the camera lens, insert the left end under the door hinge and down next to the exposure

window. With nothing more than finger pressure, gently press the focus plate in the direction of the hinge, at the same time press the focus plate all the way into the film plane (see Fig. 2-20A). The half-moon cutout in the opposite end of the plate provides a finger hole for easy removal of the focus plate.

For best trace detail, focus the camera on the oscilloscope trace, (the focus of the external graticule will usually be satisfactory). If less trace detail can be tolerated, the camera can be focused on the external graticule if desired.

Set the Lens for maximum aperture and the SHUTTER SPEED selector to T (time). Obtain a sharply focused trace on the CRT, then secure the camera against the oscilloscope. Open the camera shutter and observe the trace on the focus plate. When the split image focus plate (TEKTRONIX Part No. 387-0893-02) is used, observe the horizontal trace or graticule line in the center of the clear bi-prism spot. Adjust the FOCUS knob on the camera until the horizontal trace or graticule line is aligned with itself (see Fig. 2-20C). If a focus plate without the split image is used, adjust the FOCUS knob for a sharply focused trace or graticule line on the focus plate.

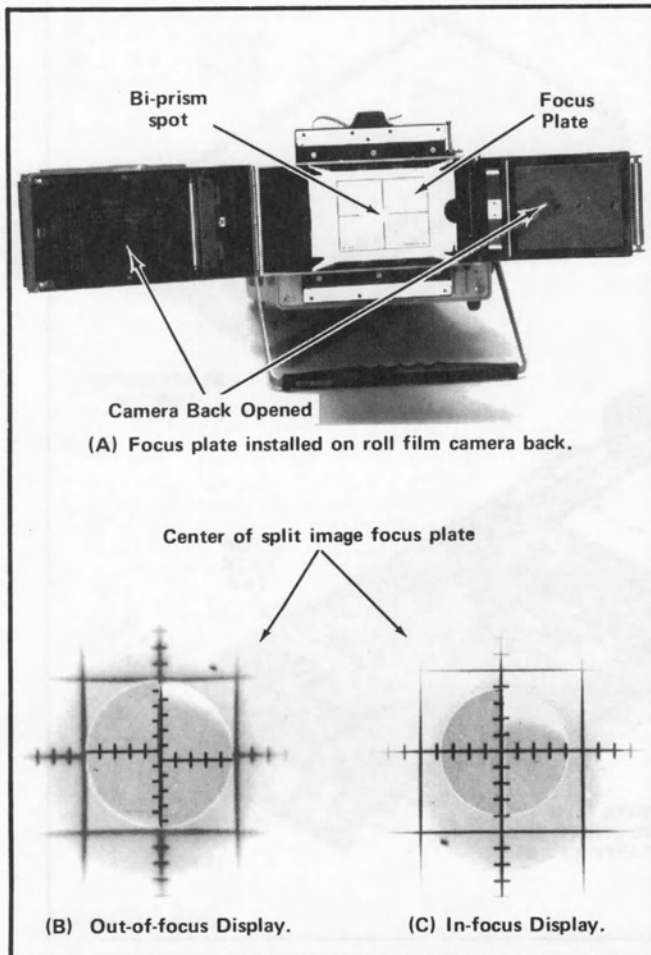


Fig. 2-19. Focus Plate Installation and Focus Displays (Roll film camera back).

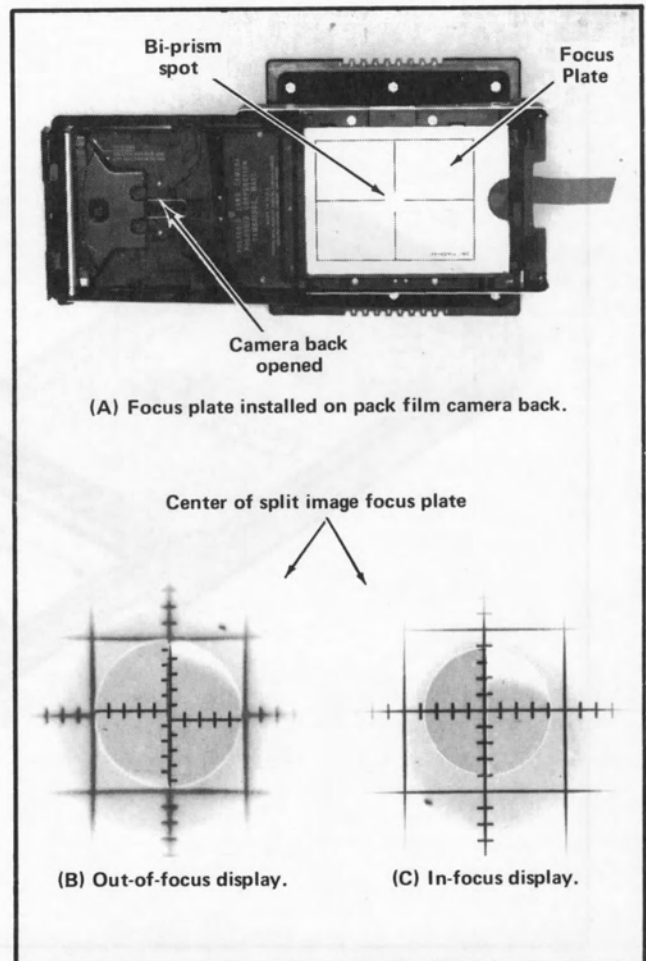


Fig. 2-20. Focus Plate Installation and Focus Displays (Pack film camera back).

## INSTALLING PACK FILM

The following procedure, when used with Figure 2-21 describes how to install pack film in the camera.

1. Release the camera door latch and open the film door.
2. Remove the empty film container (if applicable) by lifting up on the pack film tab and pulling to the right.
3. Clean the rollers if necessary.

### NOTE

*For the camera to operate properly, the processing rollers in the film back must be clean. Check these rollers each time film is inserted. Instructions for removal of the rollers are displayed inside the film door. Should these instructions be missing or faded, the rollers can be cleaned by using a damp cloth or cotton-tipped applicator to remove any deposits.*

4. Open the film box and carefully remove the foil-wrapped pack film. Retain the instruction sheet and print coater.
5. Remove the film pack from the foil, handling the pack only by its edges.
6. Insert the film pack into the film plane, pushing it to the left and down until it snaps into place. Ensure that the black paper leader is hanging over the right end of the camera back and that the numbered white tabs are not caught between the film pack and film plane.
7. Close the film door, ensuring that the black paper leader and numbered white tabs are outside the door. Swing the door latch into place until it snaps into the locked position.
8. Pull the black paper leader completely out. This will expose the first white film tab. The camera is now ready for taking the first picture. The numeral on each white film tab indicates the sequential number of the picture that is ready for exposure.

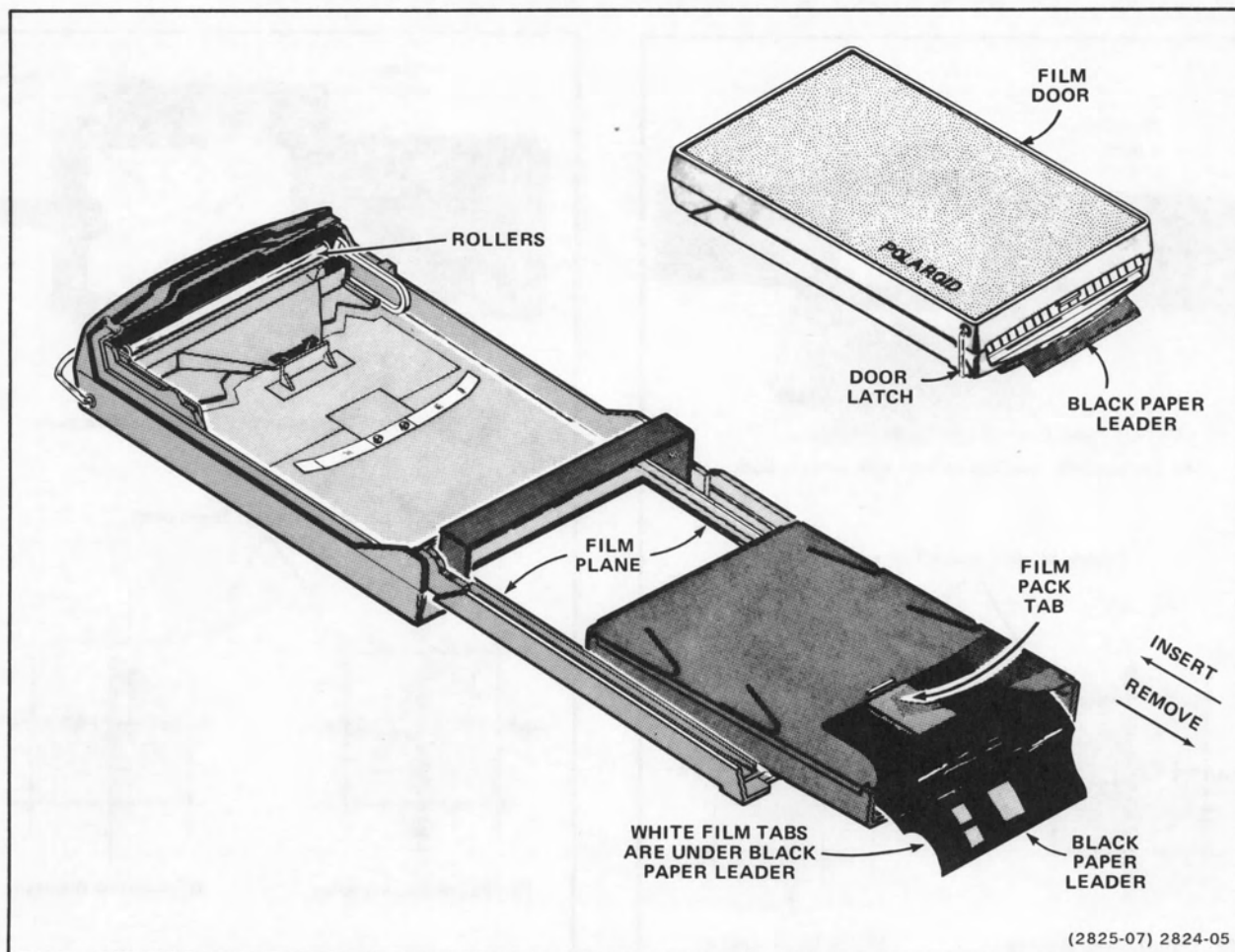


Figure 2-21. Installing the pack film.

## DEVELOPING THE PACK FILM

After a picture is taken, advance and develop each exposure as follows (see Figure 2-22).

1. Pull the white tab completely out of the film back. A yellow tab with black arrows should appear.

### NOTE

*If the yellow tab does not appear after the white tab is pulled, take the camera to a darkened area, open the film back, and carefully remove the yellow tab that failed to pop out.*

2. Smoothly pull the yellow tab completely out of the film back using one continuous motion.

### NOTE

*Development time for Type 084 film is approximately 15 seconds at an ambient temperature of 70° F or above. A slightly longer development time generally provides greater print contrast. Shorter development time will decrease print contrast, but may improve photographed details not otherwise visible.*

3. Wait for the proper development time. Follow the directions contained in the film instruction sheet for proper development times under various conditions.

### WARNING

*Many developing solutions contain a caustic substance which may cause chemical burns. If you accidentally get the solution on your skin, wipe it off immediately and wash the area thoroughly as soon as possible. Be extremely careful to keep the solution away from your eyes and mouth.*

4. When the development time is up, carefully peel the print away from the negative. Do not allow the print to touch the damp negative after the two have been separated.
5. Prints that require coating should be coated as soon as possible after separation from the negative. Use six to eight overlapping strokes to apply the print coater along the entire length of the print, including edges, borders and corners.

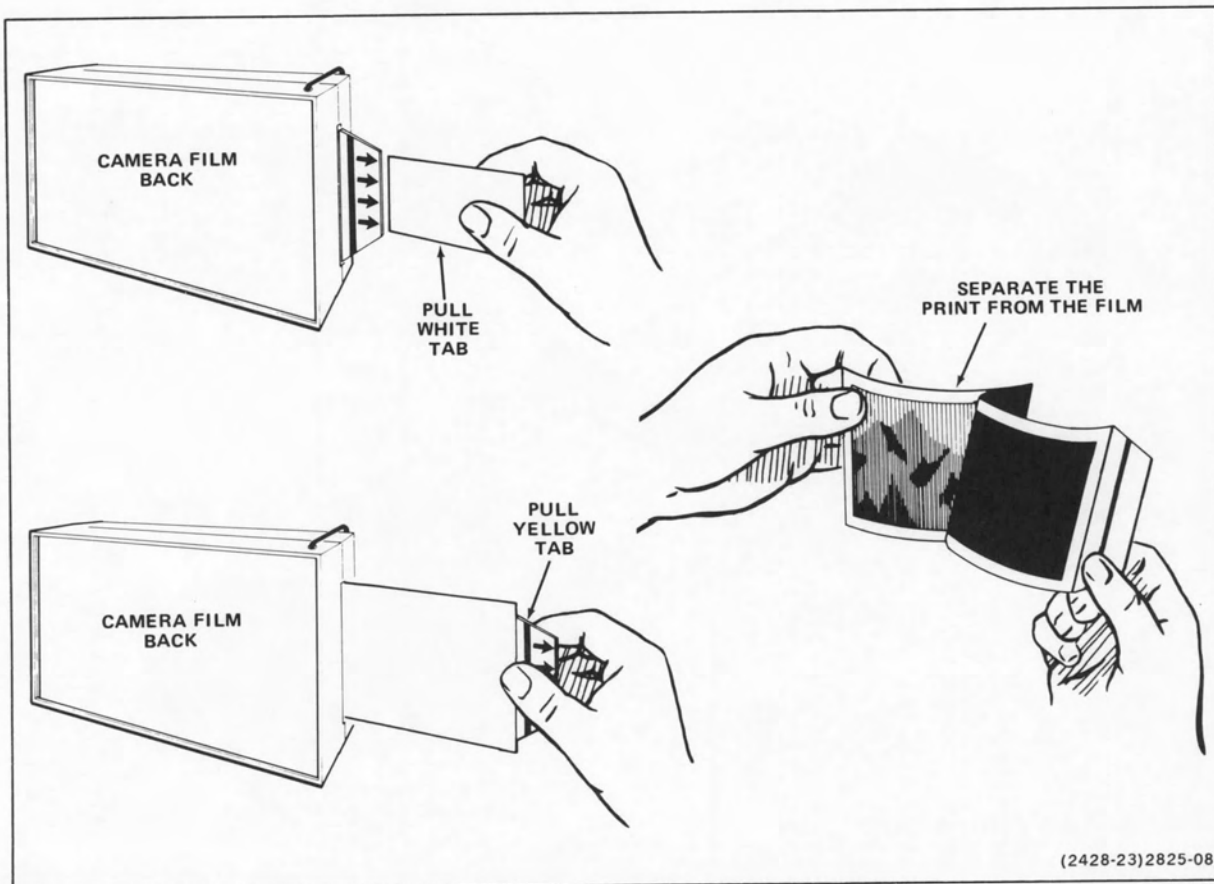


Figure 2-22. Developing the pack film.



## PICTURE TROUBLE

### No Image on Picture

1. Use a slower shutter speed setting.
2. Use a film with a higher ASA rating.

### Light Streaks on Picture

1. If light leaks between the camera frame and spacer or the lens-shutter assembly, check that the various camera sections are properly secured.
2. Rollers in the Polaroid camera back may be dirty.
3. Polaroid film pack was handled too roughly during loading.

### Fogging on Picture

1. Instrument scale illumination control may be set too high.
2. Bad film.
3. Film was exposed to light during loading.

### Some Portions of Photographed Signal Appear Brighter Than Others

Use an exposure time long enough to allow several sweeps to occur.



# SECTION 3

## PHOTOGRAPHIC TECHNIQUES

### CAMERA-OSCILLOSCOPE CONSIDERATIONS

#### Writing Speed

Writing speed is a figure of merit which roughly describes the ability of a particular camera system mounted on a particular oscilloscope to photograph fast-moving traces. The writing speed figure expresses the maximum spot speed (usually in centimeters per microsecond) which can be photographed satisfactorily.

The faster the oscilloscope spot moves, the dimmer the trace becomes. This is because the electron beam strikes each point on the phosphor coating for a shorter period of time. A camera system and oscilloscope which have a high writing speed are required for low-repetition-rate displays at the fast oscilloscope sweep rates.

Fig. 3-1 shows one way in which writing speed can be calculated. A single trace of a damped sine wave is displayed. The frequency of the damped waveform is such that the rapidly rising and falling portions of the first cycle or two fail to photograph. The writing speed of the system is found as follows: Starting from the left, find the first rapidly rising or falling portion of the damped sine wave which is photographed in its entirety. Let  $D$  represent the vertical distance in centimeters between the peaks which are connected by this portion. If  $D$  is three or more times as great as the horizontal distance occupied by one cycle (so that the horizontal component of velocity is small compared to the vertical component), the maximum writing speed in centimeters per microsecond is given approximately by:

$$\text{Maximum writing speed} = \pi Df$$

where  $f$  is the frequency of the damped wave in megahertz.

It is inadvisable to speak of the absolute writing speed of any oscilloscope or camera, because so many variables are involved. Among the variables which must be considered are the speed of the camera lens, the type of CRT phosphor, the type of film, the CRT accelerating potential, the camera optical arrangement, the object-to-image ratio of the camera lens, and development time of the film.

It is possible to compare the effectiveness of two films by measuring their writing speed under the same condi-

tions. In other words, you can determine which of the two films is the more effective under those particular conditions without being able to assign a specific value to either film.

The rated film speed (ASA) of a film doesn't tell you much about its effectiveness in recording single oscilloscope traces. This is because the film speed rating is measured for 1/50 second exposure to light of normal daylight and spectral characteristics, while the very short exposures of fast CRT traces are several orders of magnitude smaller and have various spectral distributions. There is usually some relationship between film speed rating and maximum writing speed, however. Thus, it would be safe to assume that a film with a very high film speed rating would probably have a higher maximum writing speed than a film with a lower film speed rating.

### CRT SELECTION

#### Selecting the CRT Phosphor

There are a great number of phosphor types presently available to the purchaser of a cathode-ray oscilloscope. Each of these phosphors has certain advantages and disadvantages compared to the others. There is no one phosphor which is best for all applications. Of the many types of phosphors available, five are most commonly in use. They are the P1, P2, P7, P11 and P31. Other phosphor types are usually restricted to special applications. Since the P1, P2, P7, P11 and P31 phosphors are the ones most commonly used, information contained in this portion of the manual will primarily concern these phosphors.

For low sweep rate or repetitive-sweep applications where a high writing speed is not required, practically any type of phosphor is satisfactory. It is only for single-sweep or low-repetition-rate applications at the fast sweep rates where selection of the CRT phosphor is important. In low-repetition-rate applications at the fast sweep rates, use of the proper phosphor can mean the difference between getting a good photograph and not getting one at all.

Probably the most important single characteristics of a phosphor for photographic purposes is the color of its emitted light. A blue or violet fluorescence has the highest actinic value and is thus most suitable for photographic work.

In general, (all other things being equal) the shorter the wavelength of the visible peak emitted light, the better the phosphor for photographic applications.

Most users of oscilloscopes are concerned not only with photographing the oscilloscope trace but in observing it directly as well. For such applications, it is important to have a phosphor which gives good results in both types of applications. This frequently results in the choice of a phosphor such as P2 and P31 where the emitted light has a large enough actinic value to give a good writing speed, and also has sufficient persistence to permit easy viewing.

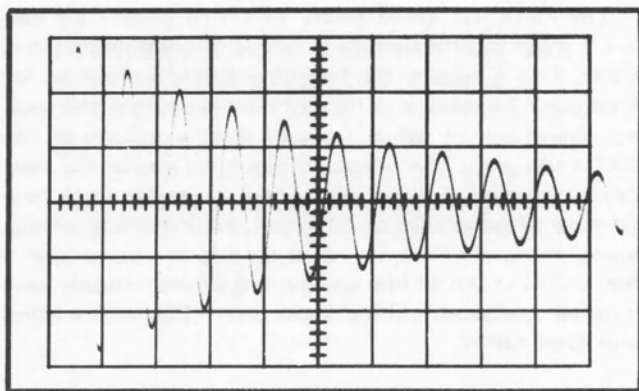


Fig. 3-1. A single-shot damped sinusoidal waveform which can be used to measure the maximum writing rate of an oscilloscope-camera combination.

It has been observed that the P11 phosphor has the highest comparative writing speed of any common phosphor, and is thus best for photographic work on most fast emulsions. The medium short persistence of the phosphor is somewhat undesirable for general purpose work, but the disadvantages of this are slight. Type P11 should be chosen whenever the ultimate in photographic capability is required. Type P11 emits a medium short-duration, violet-blue light.

Since the Type P2 or P31 phosphors appear to be best for combined general purpose use and photographic applications, they are standard on most Tektronix oscilloscopes. Type P11 is standard on Tektronix oscilloscopes where extremely rapid sweeps make it possible to obtain maximum benefit from the advantages of this phosphor. Other phosphors can be obtained on any of the Tektronix oscilloscopes.

## FILM SELECTION

### Selecting the Proper Film

For most oscilloscope work you will find Polaroid Land film the most convenient. This film permits you to see the picture very soon after taking it, and makes it unnecessary to expose all of the film before developing a single photograph.

TABLE 3-1

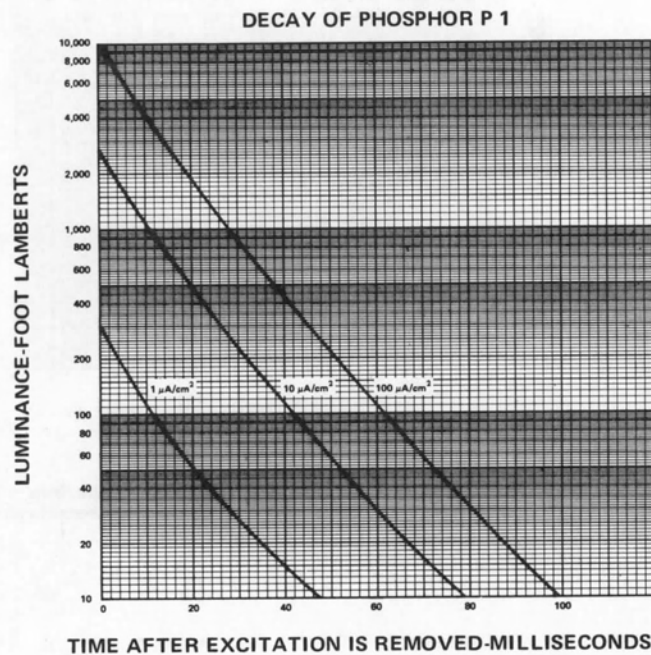
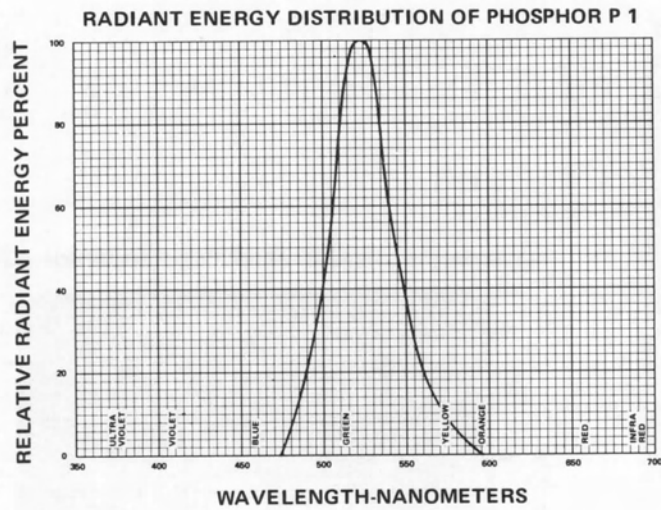
COMMON PHOSPHOR SUMMARY TABLE

Phosphor Type	Characteristic Graph Figures	<sup>1</sup> Relative Photo Writing Speed P11 Standard	<sup>2</sup> Relative Brightness 10 kV aluminized screen P31 Standard	Wavelength Peak Radiant Energy	Decay Time in ms to 0.1% of initial value	Color	
						Fluorescence	Phosphorescence
P1	3-2	20% as fast	50% as bright	520 nm <sup>3</sup>	95	Yel-Grn	Yel-Grn
P2	3-3	40% as fast	55% as bright	510 nm <sup>3</sup>	120	Blu-Grn	Yel-Grn
P7	3-4	75% as fast	35% as bright	450 nm <sup>3</sup>	1500	Blu-Wht	Yel-Grn
P11	3-5	100%	15% as bright	450 nm <sup>3</sup>	20	Vio-Blu	Vio-Blu
P31	3-6	50% as fast	100%	530 nm <sup>3</sup>	32	Yel-Grn	Yel-Grn

<sup>1</sup>To achieve the writing speed comparisons the shutter of the test camera was left open five seconds to make use of the available light and Polaroid Land Type 410 film was used.

<sup>2</sup>Taken with a Spectra Brightness Spot Meter, which incorporates a C.I.E. Standard Eye Filter.

<sup>3</sup>Specific value in nanometers.

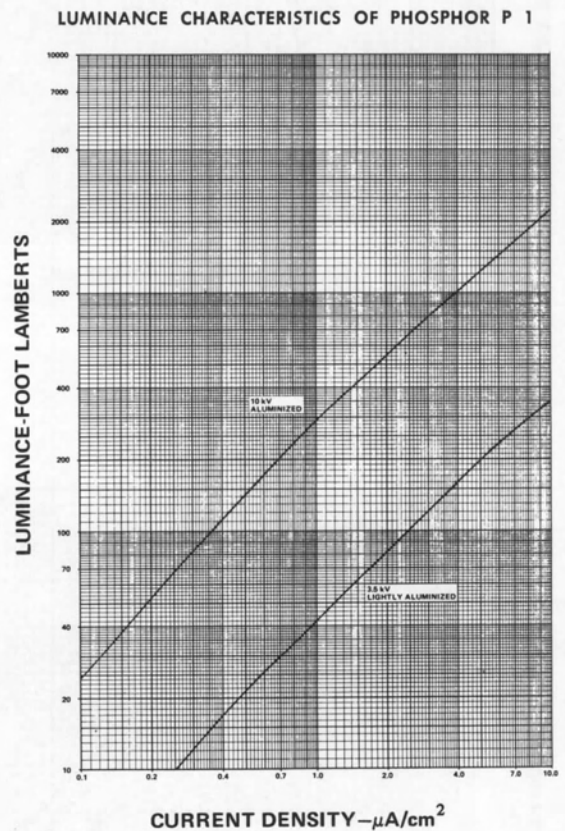


**BUILDUP**

Approximately 14 milliseconds to 90% at  $10 \mu\text{A}/\text{cm}^2$ .

**DECAY**

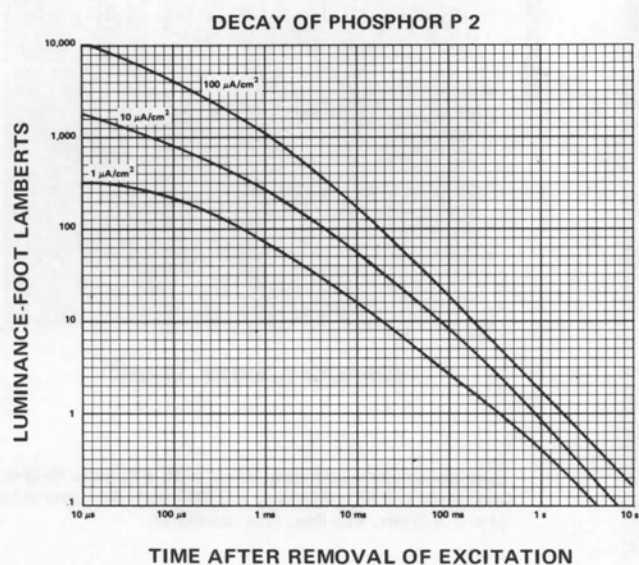
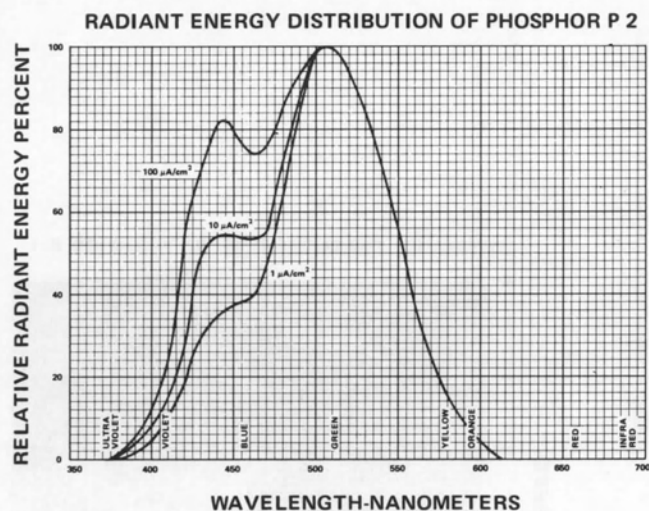
Essentially exponential, largely independent of excitation conditions. Measured at 10 kV and with 50 millisecond excitation pulse.



Luminance measurements taken with a Spectra Brightness Spot Meter, observing a 0.250 inch diameter area of a 2 X 2 cm, 135 line, focused raster.

Fig. 3-2. Typical cathode ray tube P1 phosphor characteristics.





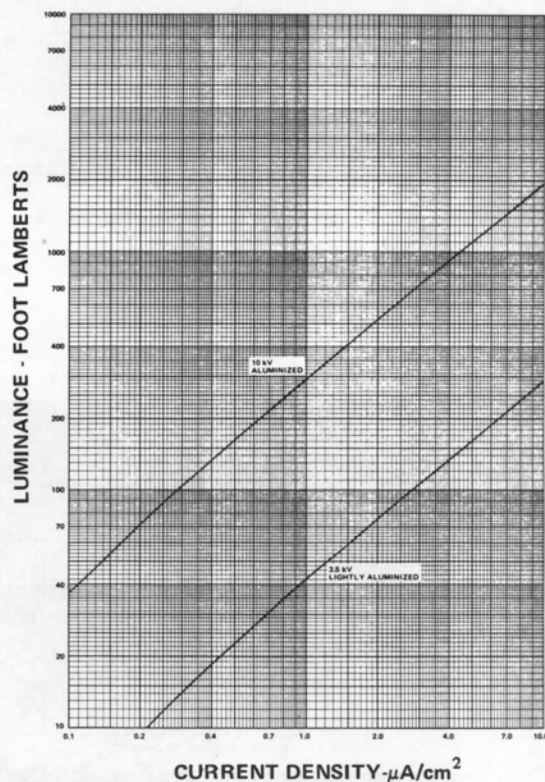
#### BUILDUP

Approximately 400 milliseconds to 90% at  $10 \mu\text{A}/\text{cm}^2$ .

#### DECAY

Essentially power law, somewhat dependent upon excitation conditions. Measured at 10 kV and with 5 millisecond excitation pulse.

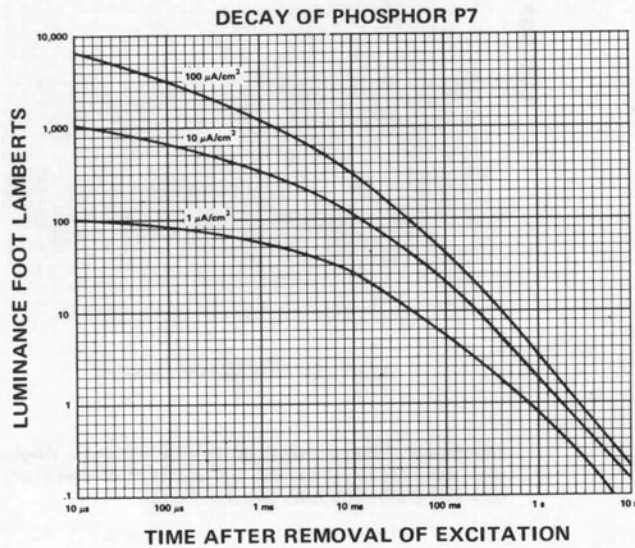
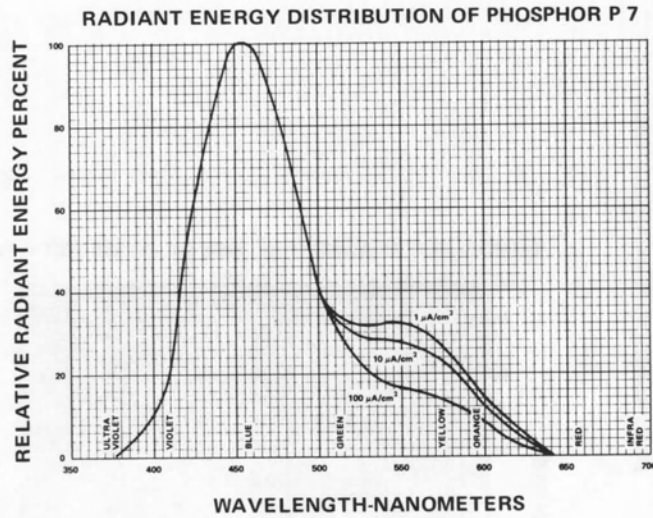
#### LUMINANCE CHARACTERISTICS OF PHOSPHOR P 2



Luminance measurements taken with a Spectra Brightness Spot Meter, observing a 0.250 inch diameter area of a 2 X 2 cm, 135 line, focused raster.

Fig. 3-3. Typical cathode ray tube P2 phosphor characteristics.





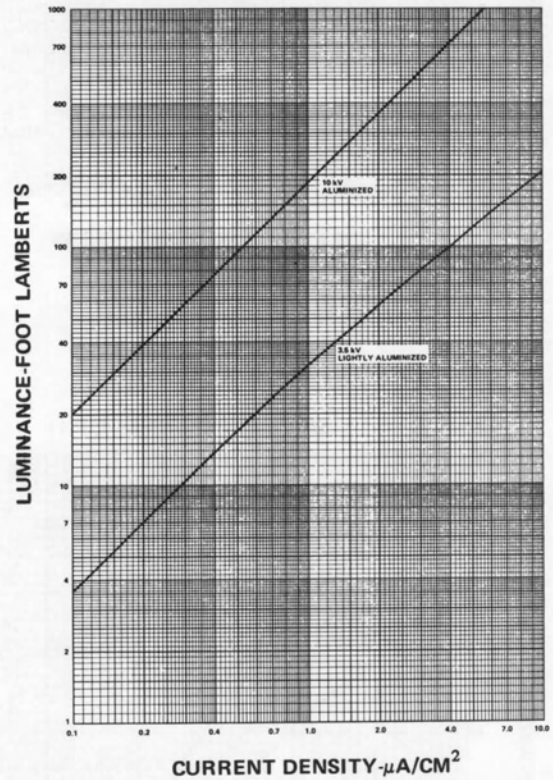
**BUILDUP**

Approximately 1.5 milliseconds to 90% at  $10 \mu\text{A}/\text{cm}^2$ .

**DECAY**

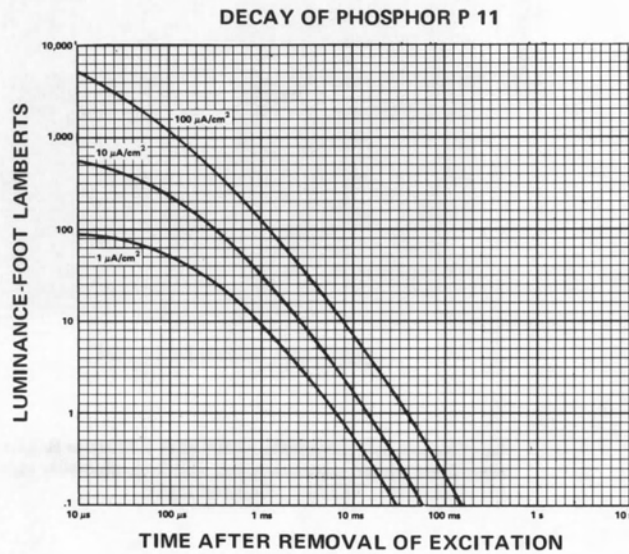
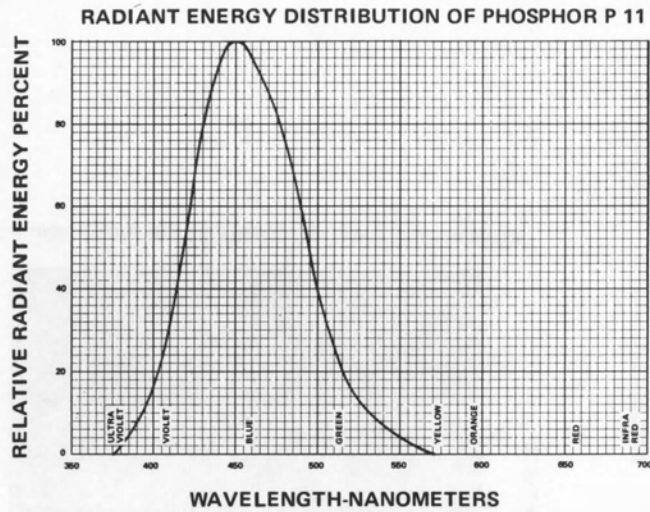
Essentially power law, somewhat dependent upon excitation conditions. Measured at 10 kV and with 5 millisecond excitation pulse.

**LUMINANCE CHARACTERISTICS OF PHOSPHOR P 7**



Luminance measurements taken with a Spectra Brightness Spot Meter, observing a 0.250 inch diameter area of a 2 X 2 cm, 135 line, focused raster.

Fig. 3-4. Typical cathode ray tube P7 phosphor characteristics.



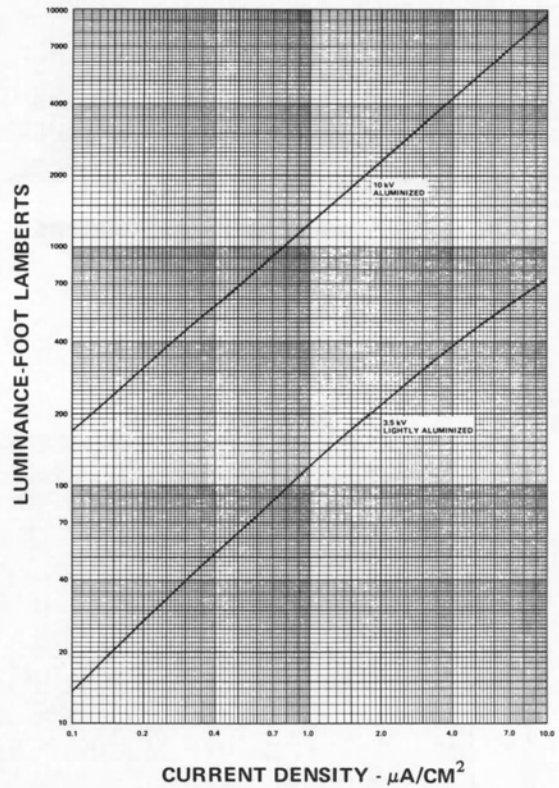
#### BUILDUP

Approximately 380 milliseconds to 90% at  $10 \mu\text{A}/\text{cm}^2$ .

#### DECAY

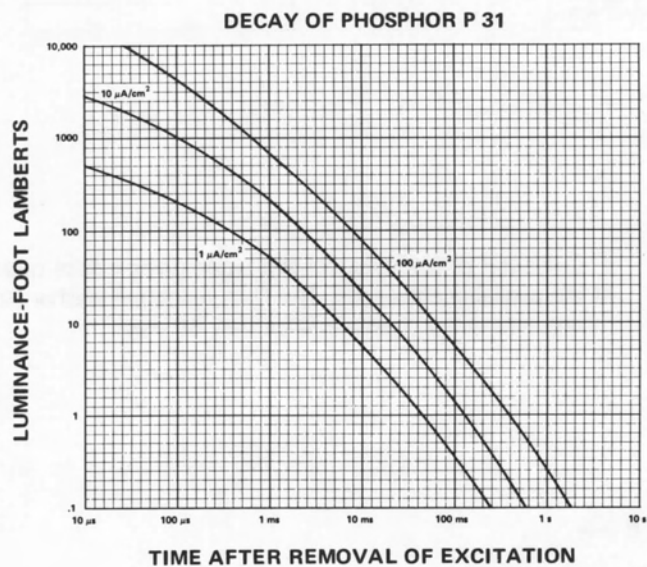
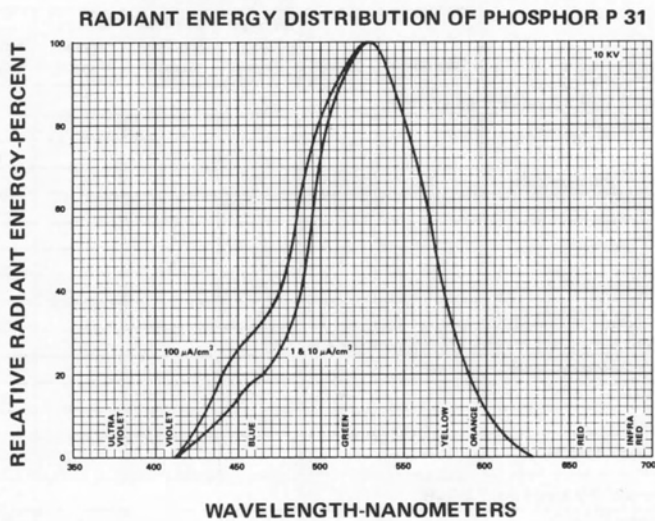
Essentially power law, somewhat dependent upon excitation conditions. Measured at 10 kV and with 5 millisecond excitation pulse.

#### LUMINANCE CHARACTERISTICS OF PHOSPHOR P 11



Luminance measurements taken with a Spectra Brightness Spot Meter, observing a 0.250 inch diameter area of a 2 X 2 cm, 135 line, focused raster.

Fig. 3-5. Typical cathode ray tube P11 phosphor characteristics.

**BUILDUP**

Approximately 500 microseconds to 90% at  $10 \mu\text{A}/\text{cm}^2$ .

**DECAY**

Essentially power law, somewhat dependent upon excitation conditions. Measured at 10 kV and 5 millisecond excitation pulse.

**LUMINANCE CHARACTERISTICS OF PHOSPHOR P 31**

LUMINANCE-FOOT LAMBERTS

CURRENT DENSITY -  $\mu\text{A}/\text{CM}^2$

Luminance measurements taken with a Spectra Brightness Spot Meter, observing a 0.250 inch diameter area of a 2 X 2 cm, 135 line, focused raster.

Fig. 3-6. Typical cathode ray tube P31 phosphor characteristics.

TABLE 3-2

## POLAROID LAND FILM TYPE SUMMARY

Film Type	ASA Equivalent Speed	Development Time (Seconds at 75°F)	Format	Resolution (Line Pairs/mm)	Characteristics	CRT Recording Uses					
						Repetitive	Stored	TV Type (Gray Scale)	Scintillation Type Medical	Graphics Alpha-Numeric	Single Sweep
PACK FILMS — Actual image size 7.3 cm x 9.5 cm (3-1/4 x 4-1/4 in)											
611*	200	45	Positive Print	20	Low Contrast, wide gray scale			X			
612**	20,000	30	Positive Print	20-25	High Contrast						X
665	75	30	Negative	160-180	Medium Contrast, wide gray scale	X	X	X			
107	3,000	15	Positive Print	20	Medium Contrast	X	X				X
084**	3,000	15	Positive Print	16	Medium Contrast	X	X	X	X		
667***	3,000	30	Positive Print	16	Medium Contrast	X	X	X	X		
108*	75	60	Positive Print	15-17	Color — Balanced for 5500° K	X		X			
668*	75	60	Positive Print	15-17	Color — Balanced for Electronic Flash	X		X			
ROLL FILMS — Actual image size 7.3 cm x 9.5 cm (3-1/4 x 4-1/4 in) (46L and 146L are 6.2 x 8.3 cm)											
42	200	15	Positive Print	25-28	Medium Contrast, wide gray scale	X	X	X			
47	3,000	15	Positive Print	20-22	Medium Contrast	X	X				X
46L	800	130	Positive Trans	35-40	Medium Contrast	X	X	X			
146L	200*** 100	30	Positive Trans	40-50	High Contrast, Blue Sensitive	X				X	
SHEET FILMS — Actual image size 8.9 x 11.4 cm (4 x 5 in)											
51	320*** 115 Tungsten	15	Positive Print	28-32	High Contrast, Blue Sensitive					X	
52	400	15	Positive Print	35-40	Medium Contrast, wide gray scale	X	X	X			
55 55 P/N	50	20	Positive Print Negative	22-25 160	Medium Contrast, wide gray scale	X	X	X			
57	3,000	15	Positive Print	20	Medium Contrast	X	X			X	X
58*	75	60	Positive Print	15-17	Color — Balanced to 5500° K	X		X			

\*No coating required.

\*\*Preferred for oscilloscope photography.

\*\*\*Daylight rating.

Table 3-2 of Polaroid film types gives a brief outline of the available emulsions. The films recommended or films having equivalent characteristics may be used.

Table 3-3 of conventional film types gives a brief outline of the available emulsions. The films recommended or films having equivalent characteristics may be used.

TABLE 3-3

## CONVENTIONAL FILM TYPES

Manufacturer	Film Name	ASA Speed	Remarks
Eastman	Tri-X	400	High-speed, medium contrast. Roll film
	R S Pan	650	Similar to Tri-X, in sheet form.
	Royal-X Pan Recording	1250	Ultra-fast roll film with low contrast.
	Royal-X Pan	1250	Same as Royal-X Pan Recording, in sheet form.
	Plus-X Pan	125	Medium speed film with good contrast. Both sheet and roll film.



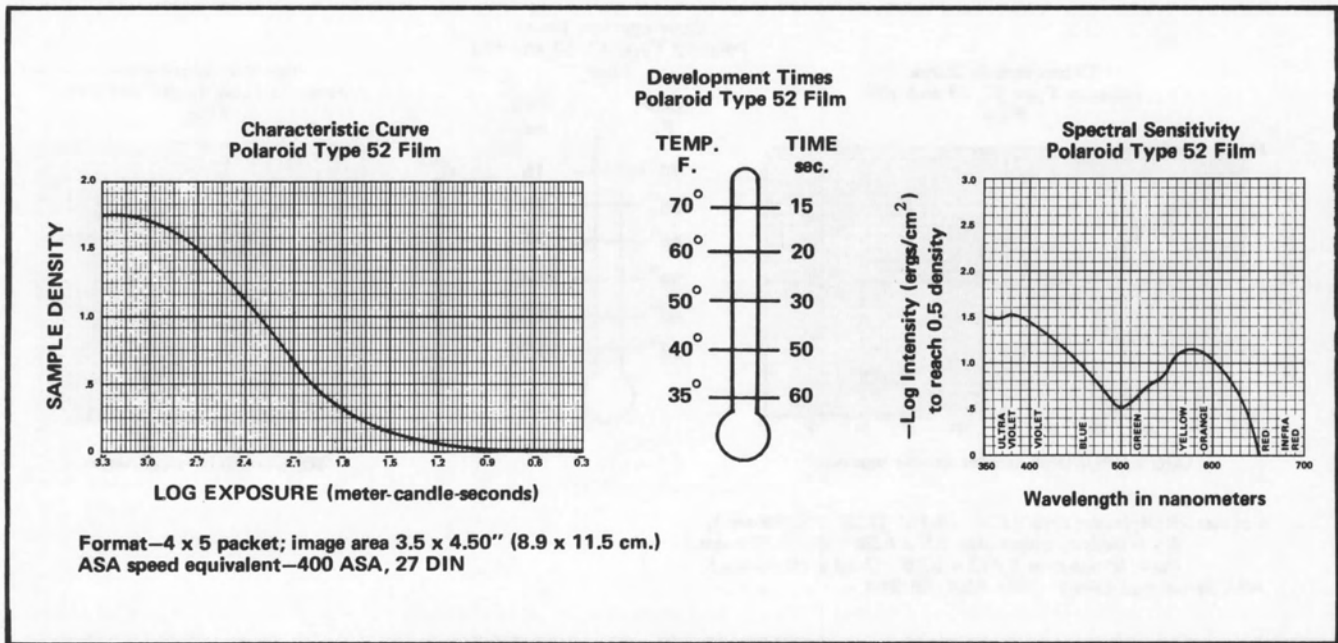


Fig. 3-7. Typical Polaroid Land Type 52 film characteristics.

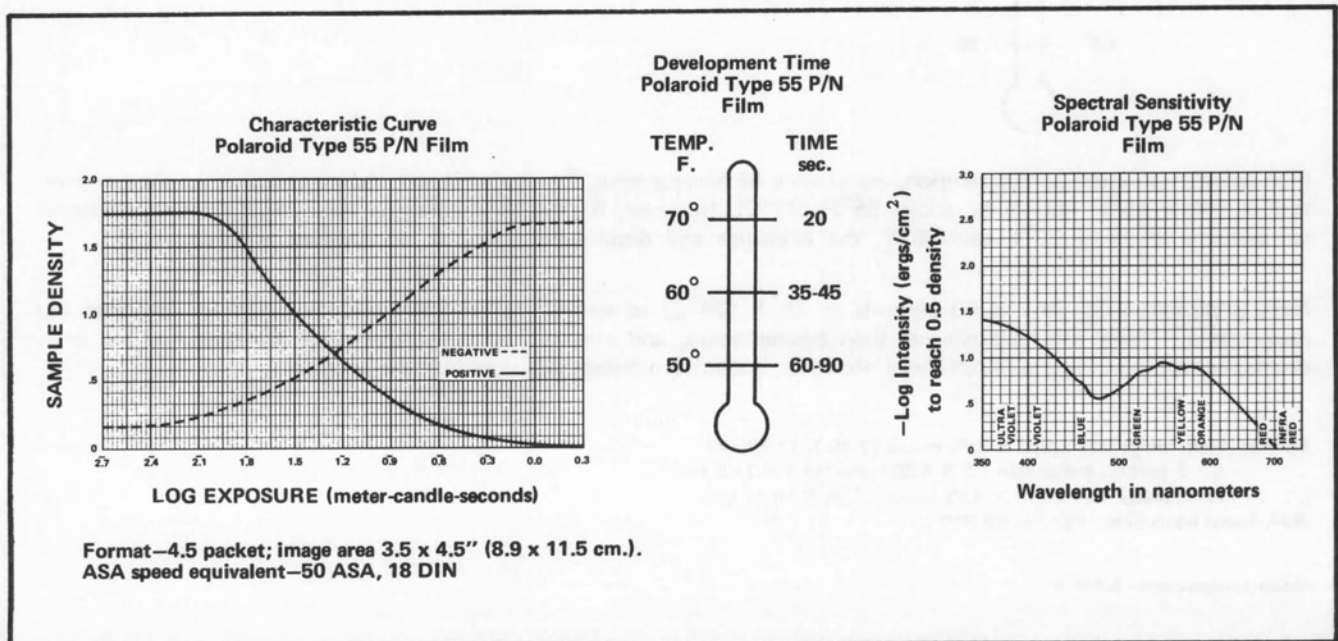


Fig. 3-8. Typical Polaroid Land Type 55 P/N film characteristics.

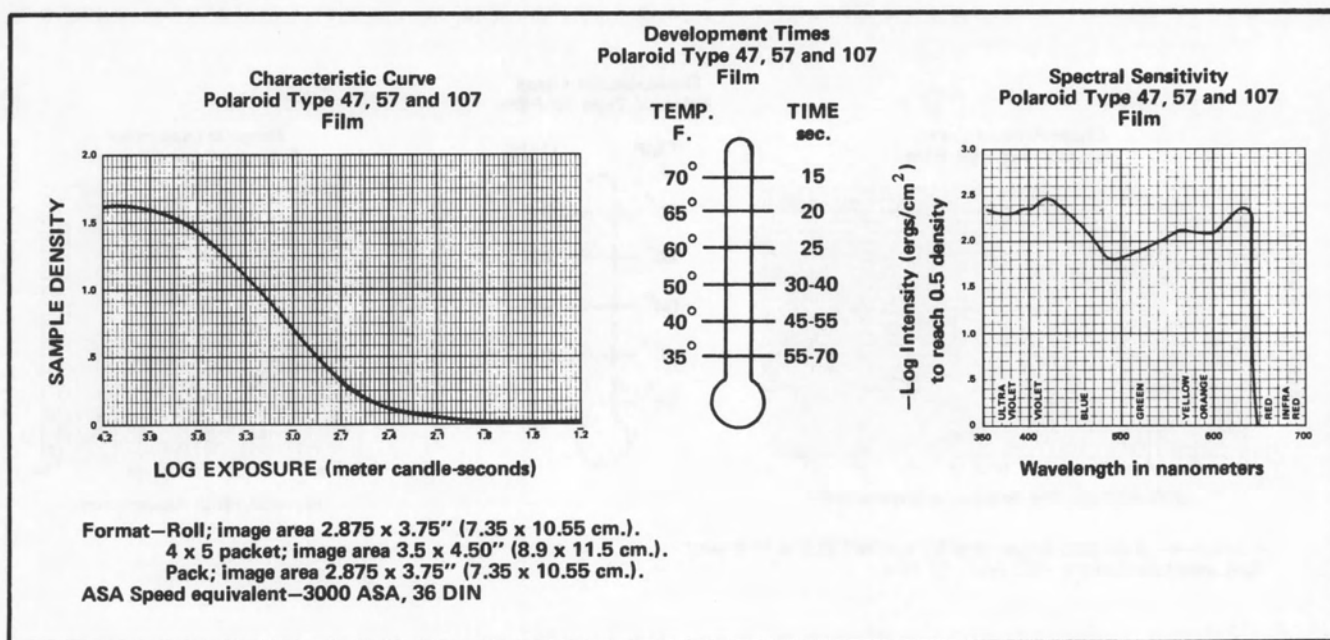


Fig. 3-9. Typical Polaroid Land Type 47, 57 and 107 film characteristics.

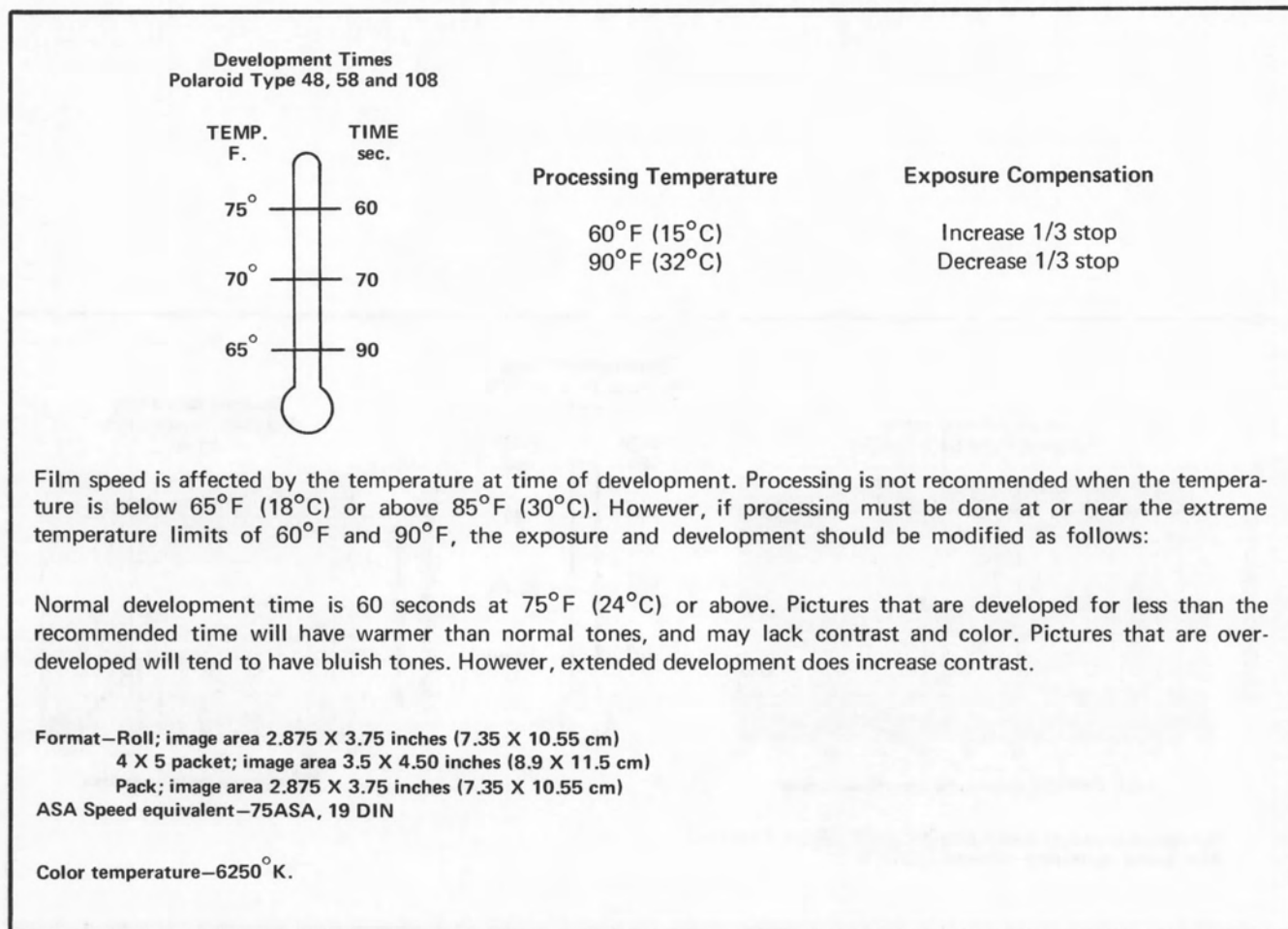


Fig. 3-10. Typical Polaroid Land Type 48, 58, and 108 film characteristics.

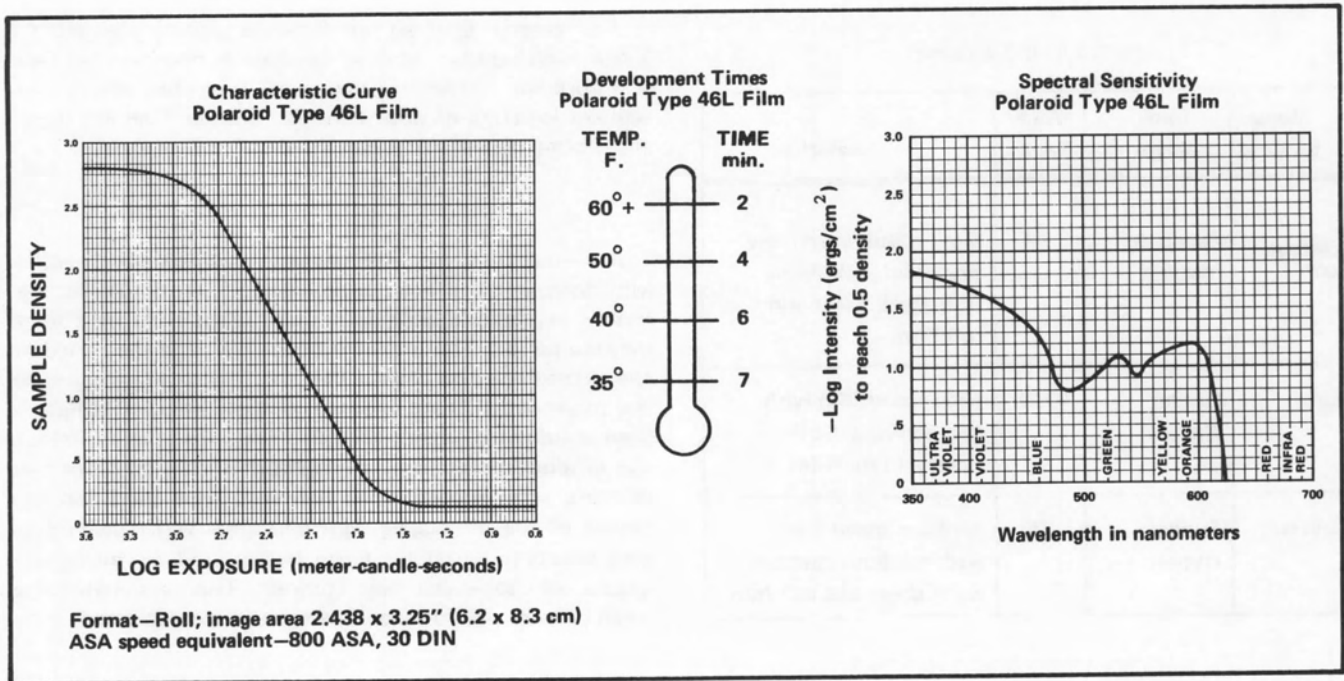


Fig. 3-11. Typical Polaroid Land Type 46L film characteristics.

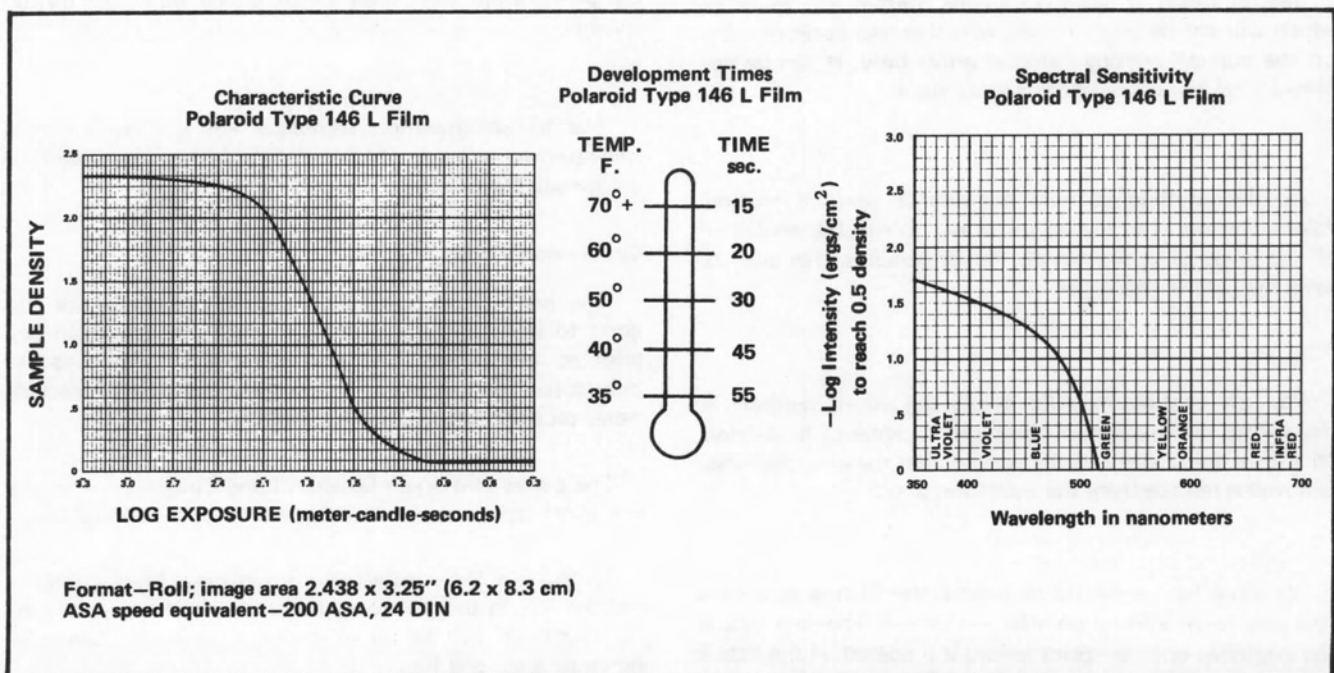


Fig. 3-12. Typical Polaroid Land Type 146L film characteristics.

TABLE 3-3 (cont)

Manu- facturer	Film Name	ASA Speed	Remarks
Eastman (cont)	Panchro- matic-X	64	Slow speed, extremely fine grain and resolution. Both sheet and roll film.
Agfa	Isopan Record	1000	High-speed film with low contrast. Both sheet and roll film.
Ansco	Super Hypan	400	Medium-speed film with medium contrast. Both sheet and roll film.

## Helpful Techniques with Film

### Polaroid Land Film

#### CAUTION

*Polaroid recommends that spray-on matte finishes not be used as a method of note marking on the self coating Polaroid Land film.*

Several types of spray-on matte finishes are available which will enable you to make pencil or pen notes directly on the non-self coating Polaroid prints only. It can be obtained from any art or photo supply store.

Another method of note marking on non-self coating Polaroid prints is to use an ink eraser to rub the emulsion off the areas to be written on. Pen or pencil is then used to write the data on the print.

For self coating Polaroid prints the above method is changed to rubbing the emulsion off the areas to be written on with a damp cloth, being careful that the emulsion area removed is remote from the waveform area.

Still another method is to scratch the desired data onto the print with a sharp pointed instrument. The data should be scratched onto the print before it is coated. If the data is to be scratched onto a self coating Polaroid print, it must be done within 10 to 15 seconds after the print is separated from the negative.

For greater contrast on Polaroid prints, use slightly longer development time. A decrease in development time will normally increase writing speed; with, however, a consequent lowering of print contrast. Shorter time will sometimes bring up waveform details not otherwise visible.

A method which sometimes produces very good results with Polaroid Land films is prefogging.<sup>8</sup> In prefogging, the film is exposed to a predetermined amount of light for a definite period. The intensity of the light and the period of the exposure are so chosen that the film is brought just to the threshold of being exposed. A lesser amount of light is then required to expose the film. The prefogging technique can produce an increase in maximum writing speed of two or more times depending on film types, film condition, the nature of the prefogging light and other variables. Prefogging results in a slightly foggy background on the photographs and somewhat less contrast. This is sometimes a small price to pay for a large increase in writing speed.

Postfogging<sup>8</sup> is very similar to prefogging. The difference is that the film is exposed to the controlled light source after exposure, rather than before. Postfogging produces very nearly the same increase in writing speed as prefogging.

**Transillumination.** While not strictly a means of improving writing speed transillumination permits you to better see information which is recorded on prints. In the technique of transillumination, the print is observed with a source of bright diffused light, such as a light bulb, directly behind the print (see Fig. 3-14). The light passing through the print brings out detail which would otherwise not be evident.

The transillumination technique will not work on the one-hundred series or colored Polaroid film since they have an opaque plastic base.

### Conventional Film

The matte-finish sprays referred to previously are also good to coat standard prints and negatives on which you wish to mark. Remember that any mark on the negative may appear on the print. This suggests the idea of marking notes on the negative prior to printing.

The paragraphs under Polaroid Land Film, on prefogging and postfogging, apply equally well to conventional films.

To increase the contrast of conventional films, the film may be left in the developer longer or the temperature of the developer may be raised; however, this may result in increased grain and fog.

<sup>8</sup> For details on prefogging or postfogging contact your local Tektronix, Inc. representative or field office.



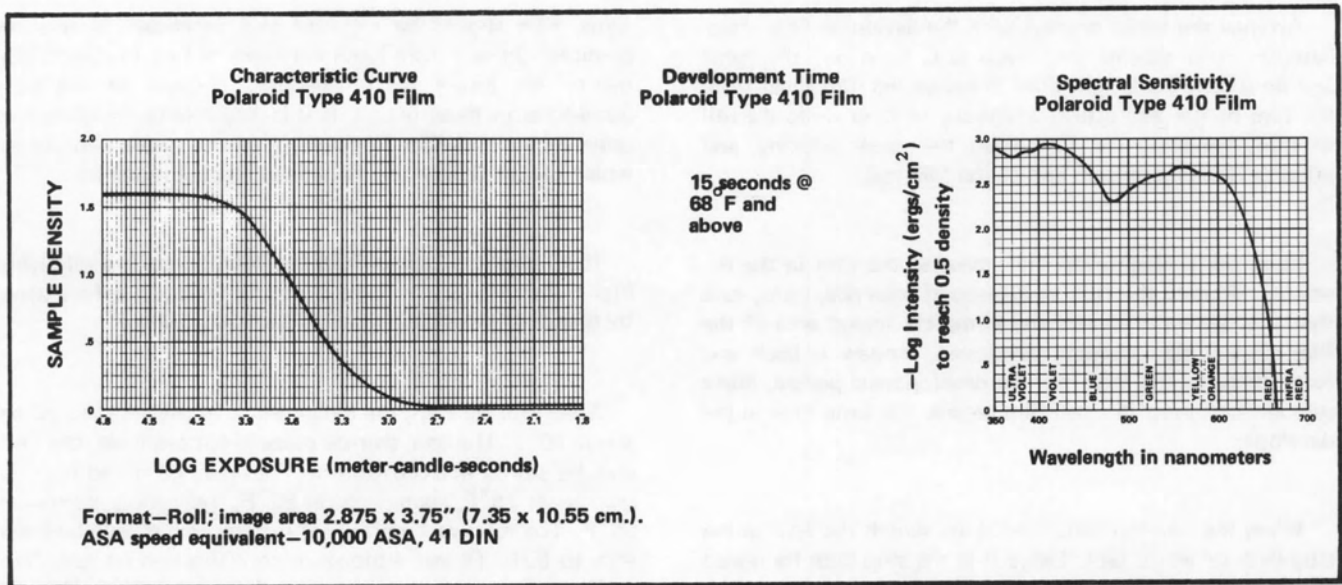


Fig. 3-13. Typical Polaroid Land Type 410 film characteristics.

The transillumination technique can be used with the conventional-film negatives and prints. It is a method by which you may see information that might not ordinarily be seen. Refer to the paragraphs on transillumination.

## Negative Film Development

### Equipment Needed

The bare essentials for the development of negative film are listed below:

1. Developer (If speed or contrast is more important than grain do not use a fine grain developer).
2. Hypo (Rapid fixer is most convenient).
3. Three glass, hard rubber, polyethylene, enameled steel, or stainless steel trays, or a development tank.
4. Thermometer.
5. Graduated measure.
6. Two containers of glass, hard rubber, polyethylene, enameled steel, or stainless steel to store the chemicals. The containers should block light from reaching the chemicals. For long-term storage, use brown glass bottles.
7. Timing device (must be readable or audible in a dark room, if one is used).

Additional equipment that will simplify the job of developing the negative film:

1. Stop-bath (Stops development and prevents contamination of Hypo).

2. Hypo clearing agent (allows a shorter wash period).
3. Photo Flo (Stops water spotting and speeds drying).
4. Film clips (Plastic clothes pins will do).
5. Funnel.

### Procedure

**Sheet and Roll Film.** (Tank or Tray Development.) Mix the chemicals as directed. Once the chemicals are mixed and at the proper temperature, pour each one into a separate tank or tray. If no stop-bath is available, then substitute water in this tray.

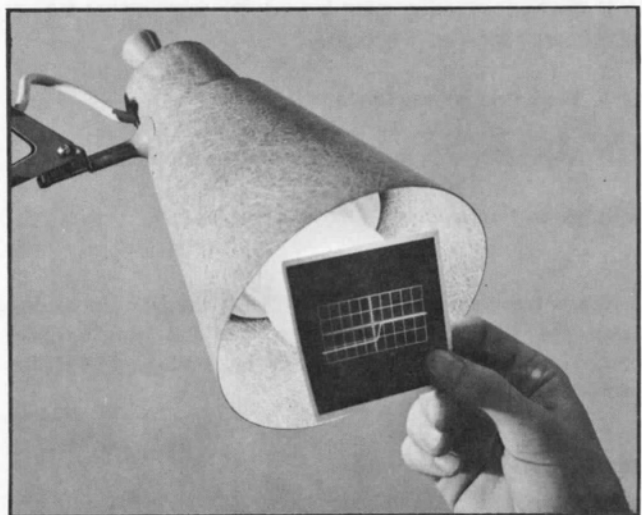


Fig. 3-14. Using transillumination to see otherwise invisible information.

Arrange the tanks or trays with the developer first, stop-bath or water second, and hypo last. Turn out the lights and be sure room is light tight. Remove the film sheet from the film holder and attach a film clip to it; or undo the roll of film, removing the film from the paper backing, and attach a film clip to each end of the film roll.

Start the timing device and immerse the film in the developer. Agitate the film at 30-second intervals, being sure that the developer covers the complete image area of the film. If roll film is being developed, see-saw it back and forth through the tank for the development period. Make sure all portions of the roll film receive the same time in the developer.

When the development time is up, switch the film to the stop-bath or water tank. Leave it in the stop-bath for about one minute. Roll film should be see-sawed back and forth through the stop-bath to insure that the stop-bath covers all areas of the film.

Remove the film from the stop-bath at the end of one minute and immerse it in the fixing bath. Roll film should be see-sawed back and forth through the hypo tank in such a way that all parts of the film come into contact with the hypo solution. The length of time in the fixer will depend upon the solution and the type of film. (See the directions packed with the film.)

Place the film into a container in the sink and allow running water to rinse it for about 30 minutes. The water in the container should have one complete change at least every five minutes.

If the hypo clearing agent is used, the washing procedure in the paragraph above becomes:

1. Wash one minute in water.
2. Treat film with hypo clearing agent for 2 minutes.
3. Wash film in water for five minutes.

When the washing is complete, hang the film up to dry using the film clips. Make sure that the film touches nothing while it is drying. The film clips must not be clipped onto an image area.

### Storage of Supplies

**Conventional Film.** Do not open a film package until it is to be used. The vapor tight packaging will protect the film against high humidities. Under high-humidity condi-

tions, film should be exposed and processed as soon as possible. Do not store open packages of film in damp basements, ice boxes, or refrigerators because of the high humidities in these places. If it is desirable to refrigerate an open package of film, it should be placed inside a can or jar which can be tightly sealed to keep out the moisture.

If an open package of film has been stored in a relatively high-humidity (above 60%) it should be dried before using by means of a desiccating agent such as silica gel.

When storing film, the temperature in the area should be about 70°F. If a cool storage place is not available, the film may be stored in a refrigerator. Film may be stored for two months at 75°F, six months at 60°F, and twelve months at 50°F. The relative humidity of storage area should be from 40% to 60%. To avoid moisture condensation on cold film surfaces, the unopened packages of film should be allowed about 30 minutes to 2 hours to come up to room temperature before opening, after they have been removed from cold storage.

Open packages of film should be kept away from chemical fumes, x-rays, and radioactive materials. Open packages of film should also be in an area with a humidity between 40% and 50%, with 40% preferred. It is better to keep open film in an area of 80°F at 40% humidity than in an area of 65°F at 70% humidity.

The developed film should ideally be stored in an area with a temperature between 60°F and 80°F with a humidity not over 50%.

**Polaroid Film.** The wrappers on Polaroid film will protect it against humidity through the expiration date. Once the film is taken out of its wrapper in high relative humidity areas, it must be exposed as soon as possible.

If it is necessary to store opened rolls or packets of Polaroid Land film, approximately the same conditions apply as with conventional film.

Polaroid film can be used at temperatures from about 40°F to 100°F. However, open film will keep longer in a temperature of 90°F at 50% humidity than it will in a temperature of 70°F at 80% humidity.

Polaroid 4 X 5 film packets are quite sensitive to humidity. The packets can be damaged rapidly when exposed to a humidity above 75%. To protect the packets, insert them into the plastic bag that came with the film

immediately upon removing the foil wrapper. Fold over the end of the bag several times to keep out the moisture.

In high humidity areas the 4 X 5 film packet should be exposed and developed within 15 minutes after it is removed from the bag.

**Developing Solutions.** When you are through using the solutions, they should be poured into air-tight containers. The screw tops should be free from rust or other foreign material and have liners or gaskets. Cork and glass stoppers present sticking problems and should not be used.

Air is one of the worst enemies of photographic solutions. Oxidation of a solution may take place even in a tightly sealed container if the solution level is low. It is advisable to store solutions in a container no larger than necessary.

The storage temperature of the solutions should be about 65°F to 70°F. Temperatures above this may cause rapid oxidation. On the other hand, too low a temperature (below 55°F) can cause the solutions to crystallize. Once a solution has crystallized, it may be impossible to redissolve the crystals. Repeated temperature changes shorten the life of solutions.

Most photographic solutions will remain good for about two months if they are stored in air tight containers of the right size and at a temperature of 60°F to 80°F. Each use of the solutions shortens the storage period.

All photographic solutions become weaker as they process additional film. All have a maximum amount of film area that can be run through them, after which they are considered of no further use. (See developer instructions.)

# SECTION 4

## PICTURE TAKING

### Photographing Repetitive Signals

The following procedure can be used to obtain an exposure for both Polaroid and conventional film.

1. Position the external graticule, if the oscilloscope has one, for white lines.
2. Mount the camera adapter on the oscilloscope.
3. Obtain the signal and adjust the controls for the desired display.
4. Attach the camera to the camera adapter and secure the camera to the camera adapter.
5. Adjust the oscilloscope Focus, Astigmatism and Intensity controls for a sharp trace.
6. Press the camera FOCUS control in and proceed to focus the camera.
7. Adjust the camera exposure controls as described in First Time Operation in Section 2 of this manual.

### Photographing Single-Sweep Displays

Single-sweep displays are formed when the oscilloscope spot sweeps across the screen only once. The actual exposure time is determined not by the shutter setting but by the duration of the sweep plus phosphor persistence, provided the shutter is open a sufficient length of time. In one type of single-sweep photography, the graticule exposes the film for the time set by the shutter while the spot on the screen exposes the film for only the duration of the sweep. It is, therefore, not usually possible to adjust the trace and graticule for the same intensity and obtain good pictures, since the effective exposure times for the two are different.

Success in obtaining good photographs of single-sweep displays will come only with experience. A few tips, however, may reduce the amount of experimenting required.

1. Use steps 1 through 6, under Photographing Repetitive Signals, to set up the camera.

2. Set the aperture control to the aperture desired. The exposure control can not be used for single shot operation. Where practical, use aperture settings higher than  $f4$  if an external graticule is used. This will permit both trace and external graticule to be in focus.

3. Set the camera MODE switch to TIME or BULB, or with oscilloscopes equipped with a +gate output connector to SINGLE SWEEP. Remember to connect a cable between the oscilloscope +gate connector and the camera +GATE IN connector if SINGLE SWEEP mode is being used.

4. Use the highest practical oscilloscope display intensity without causing defocus of the display.

5. Either adjust the graticule illumination so it exposes the film for the total shutter open time, or turn it off entirely.

6. Reset the single sweep circuitry in the instrument and open the camera shutter either automatically or manually.

7. Take the waveform photograph and close the camera shutter either automatically or manually.

8. If the graticule is being exposed separately, do it the same as would be done when taking photographs of repetitive waveforms.

9. Develop and check the picture.

It should be remembered that since the shutter open time is determined by the oscilloscope sweep, the selection of lens opening will determine how well the trace photographs. In single-sweep applications you must make your camera settings for the trace intensity and duration. You cannot use the graticule as a reference.

### Picture Troubles

1. No image appears on the picture
  - a. Dark slide still in camera back.
  - b. Inoperative shutter mechanism.



## Picture Taking—C-50 Series Cameras

- c. Exposure controls incorrectly set, that is, aperture, shutter speed combination wrong.
2. Image barely appears on a picture
  - a. Use higher Intensity and Scale Illum settings.
  - b. Wrong phosphor filter for photometer.
  - c. Exposure computer not correctly set. Wrong aperture if in BULB, TIME or SINGLE SWEEP.
  - d. See item 1c above.
  - e. Prefogging or postfogging may help. Refer to section on Photographic Techniques.
3. Light streaks on picture
  - a. Light seal between camera adapter and oscilloscope faulty.
  - b. Dirty rollers in camera back.
  - c. Film handled too roughly during loading.
4. Picture apparently cut by dark lines
  - a. Dust cover still in front of camera.
5. Fogging on pictures
  - a. Viewing door has been open allowing graticule or CRT to reflect light.
  - b. Scale Illum control set too high.
- c. Light-struck or bad film.
- d. Film exposed to light during loading.
6. Either trace or external graticule in focus with the other out of focus.
  - a. Use aperture numbers larger than  $f4$ .
7. Some portions of photographed signal appear brighter than others
  - a. Use an exposure long enough to allow several sweeps to occur.
8. Portion of photographed signal cut off by edge of film.
  - a. Make sure film size is sufficient to record the entire signal for the object-to-image ratio lens and the oscilloscope display size being photographed.

## Precautions for High Ambient Light Photographic Work

When the camera system is used in areas of high ambient light (such as outdoors in bright sunlight), some special precautions should be taken to insure good results. Make certain that the viewing hood door is closed (or that your face blocks the light) before taking the picture. Allow sufficient time after the door is closed to permit phosphorescence of the CRT screen to decay. (The phosphor absorbs energy from the ambient light.)

# SECTION 5

## FUNCTIONAL DESCRIPTION

### OPTICAL SYSTEM

#### Viewing System

The viewing system of the Main Frame consists of a viewing door, viewing tunnel and viewing hood. The CRT display is viewed at an angle, resulting in some parallax of the viewed display. The Lens, however, photographs the display directly, with minimum parallax.

#### Lenses

**C-50 Camera.** The general-purpose f1.9 Lens is used in applications where a moderately fast Lens is required. This includes single-sweep applications at the faster oscilloscope sweep rates. The six element Lens system was specifically designed for oscilloscope applications. The high amount of correction designed into the Lens system provides faithful reproduction of the oscilloscope display on the film of the camera.

**C-51 Camera.** The extra high-speed f1.2 Lens has been designed for single-sweep photography of very fast sweep rates. The f1.2 is approximately 1.5 times as fast as the f1.9 Lens. This eight-element Lens was specially designed by Tektronix for extremely fast oscilloscope waveforms.

All the Lenses provide negligible distortion of the image. Their essential differences are in their ability to photograph extremely dim traces such as those produced in single-sweep applications at the highest sweep rates.

### MECHANICAL DESCRIPTION

#### General

When taking a photograph of a scene with one of the more versatile, small conventional cameras, the only known quantity is the speed of the film. It is up to the operator to determine the scene brightness and accordingly set the aperture and shutter speed controls on the camera. An exposure meter, which may be either hand-held or built into the camera, is generally used to measure the brightness of the scene. The exposure meter, into which the operator has previously set the film speed, measures the brightness of the scene with a light-sensitive device and indicates the scene brightness by the position of a needle on a meter. The

operator now turns a dial on the exposure meter (or the shutter speed and aperture controls on an integral camera/exposure meter), which has been calibrated using the general mathematical relationship of:

$$\frac{A}{T} = 2 E_v = \frac{BS}{K}$$

where:

A = f-number of the lens

T = effective exposure time, in seconds

E<sub>v</sub> = exposure value

B = field luminance (of a uniform source)  
in foot-lamberts

S = film speed, ASA

K = constant

until an indicator is superimposed on the needle of the exposure meter. In the case of a hand-held exposure meter, it is necessary to transfer the shutter speed and aperture readings from the exposure meter to the camera controls.

#### Exposure Control

The exposure control for the Camera shown in simplified block form in Figs. 5-1 and 5-2, is very similar in operation to the integral camera/exposure meter previously mentioned. Mechanical representations of the known factors (film speed and phosphor type) are set into a factory aligned gear train in the exposure control. The gear train establishes the proper relationship between the various known factors and determines the camera speed and aperture settings for a correct exposure.

The photometer (exposure meter) in the exposure control is calibrated for the spectral characteristics of tungsten. Since each of the phosphor types have different spectral characteristics, none of which match the characteristics of tungsten, a filter (item 1 of Fig. 5-1) in the exposure con-

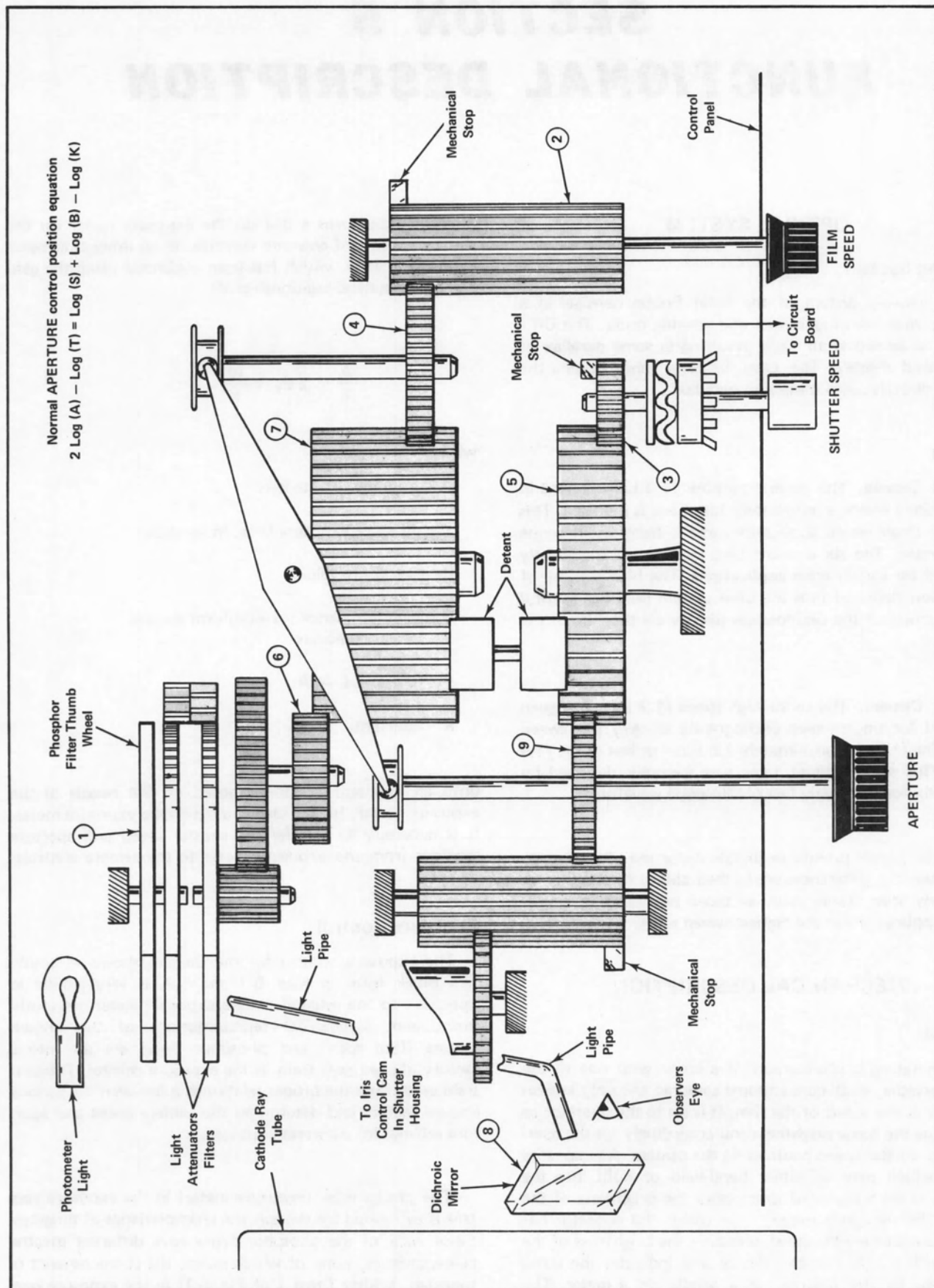


Fig. 5-1. Simplified illustration of exposure control when APERTURE control is in its normal position.

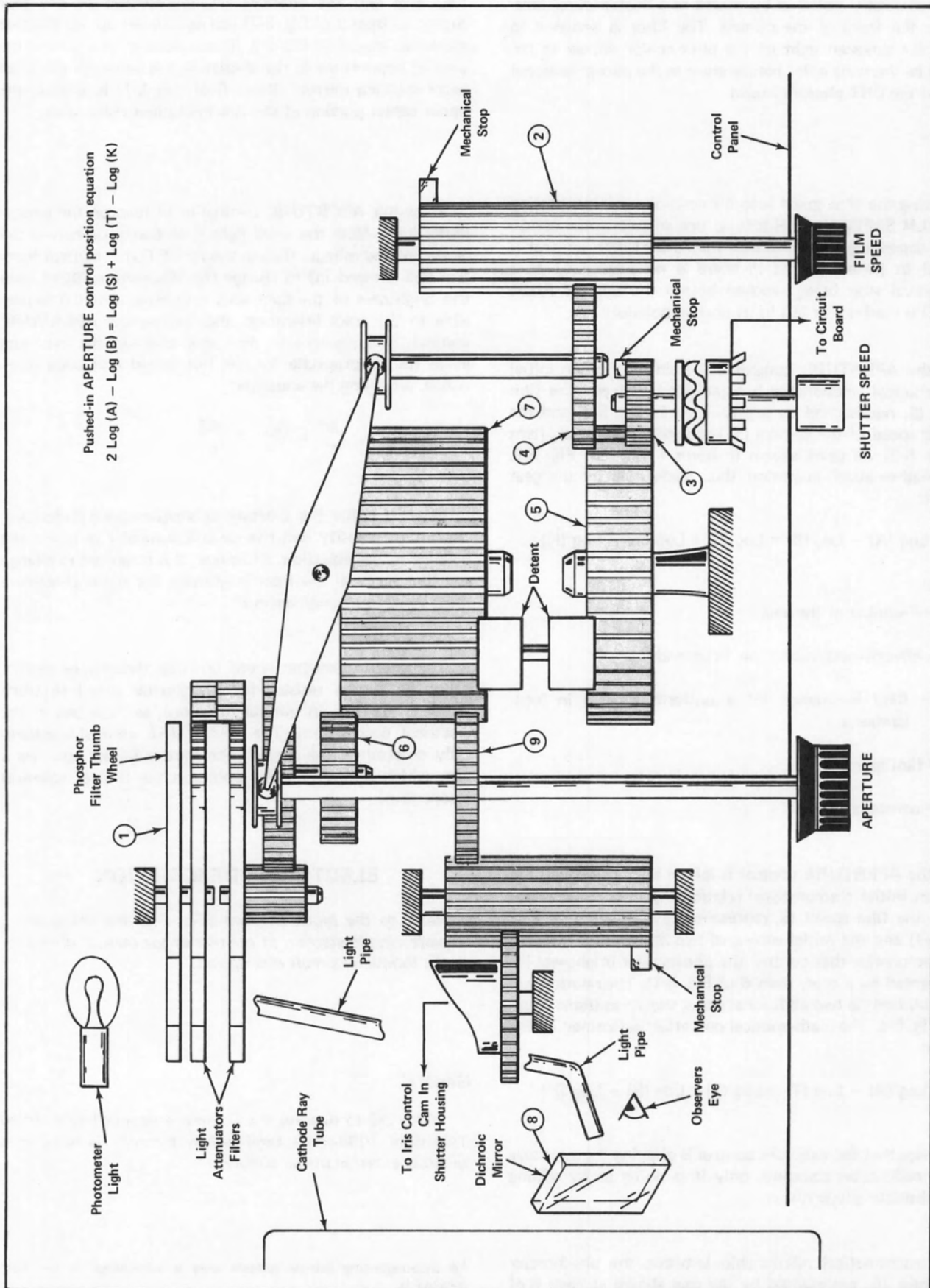


Fig. 5-2. Simplified illustration of the exposure control when APERTURE control is pushed in.



## Functional Description—C-50 Series Cameras

trol is manually dialed in by means of a thumb wheel located in the front of the camera. The filter is designed to make the tungsten light of the photometer appear to the eye to be the same color temperature as the phosphorescent light of the CRT phosphor used.

Setting the film speed into the control panel by rotating the FILM SPEED control sets up one of two initial conditions, depending upon whether the APERTURE control is pushed in (when pushed in there is no possibility of a mechanical stop being reached before the correct FILM SPEED is reached) or left in its normal position.

If the APERTURE control is pushed in, then an initial mathematical relationship is established between the film speed (S, represented by a gear, Item 2, Fig. 5-2) and the shutter speed of the camera (T, represented by a gear, Item 3, Fig. 5-2) via gears shown in Items 4 and 5 of Fig. 5-2. The mathematical operation thus performed by the gear train is:

$$2 \log (A) - \log (B) = \log (S) + \log (T) - \log (K)$$

Where:

A = f-number of the lens

T = effective exposure time, in seconds

B = field luminance (of a uniform source) in foot-lamberts

S = film speed

K = constant

If the APERTURE control is left in its normal position, then an initial mathematical relationship is established between the film speed (S, represented by a gear, Item 2 of Fig. 5-1) and the initial setting of two attenuation filters in the photometer that control the photometer brightness (B, represented by a gear, Item 6 of Fig. 5-1). The relationship is established via two additional gears, shown as Items 4 and 7 of Fig. 5-1. The mathematical operation performed in this case is:

$$2 \log (A) - \log (T) = \log (S) + \log (B) - \log (K)$$

Notice that the exposure control is obeying the exposure meter calibration equation, only it is doing so by adding and subtracting logarithms.

A mathematical relationship between the photometer brightness (B, represented by the gear shown as Item 6 of

Fig. 5-2) and the aperture (A, represented by the gear shown as Item 9 of Fig. 5-2) can now be set up, via the gear shown as Item 7 of Fig. 5-2. This is done by positioning the area of importance in the display to the center of the small beam-splitting mirror<sup>1</sup> (Item 8 of Fig. 5-1) located in the upper center portion of the viewing tunnel vision area.

Press the APERTURE control in to turn on the photometer light. Note the small light spot that appears near the center of the mirror. Rotate the APERTURE control (control still pressed in) to change the attenuation filters until the brightness of the light spot is as close a match as possible to the trace brightness, then release the APERTURE control. The photometer has now selected the exposure value (Ev) appropriate for the film speed and trace luminance, satisfying the equation:

$$\frac{A^2}{T} = 2Ev = \frac{BS}{K}$$

Now: If either the aperture or shutter speed is changed, the other quantity will change automatically to retain the balance in the equation. (However, if it is desired to change the film speed or the trace brightness, the whole procedure must be gone through again.)

The aperture/shutter speed position determines electrically the timing resistor for the shutter speed circuitry (blade open time in normal function), as described in the electrical description). The APERTURE control mechanically determines the amount the shutter blades open via a cam which adjusts a pivot point on the shutter solenoid mechanism.

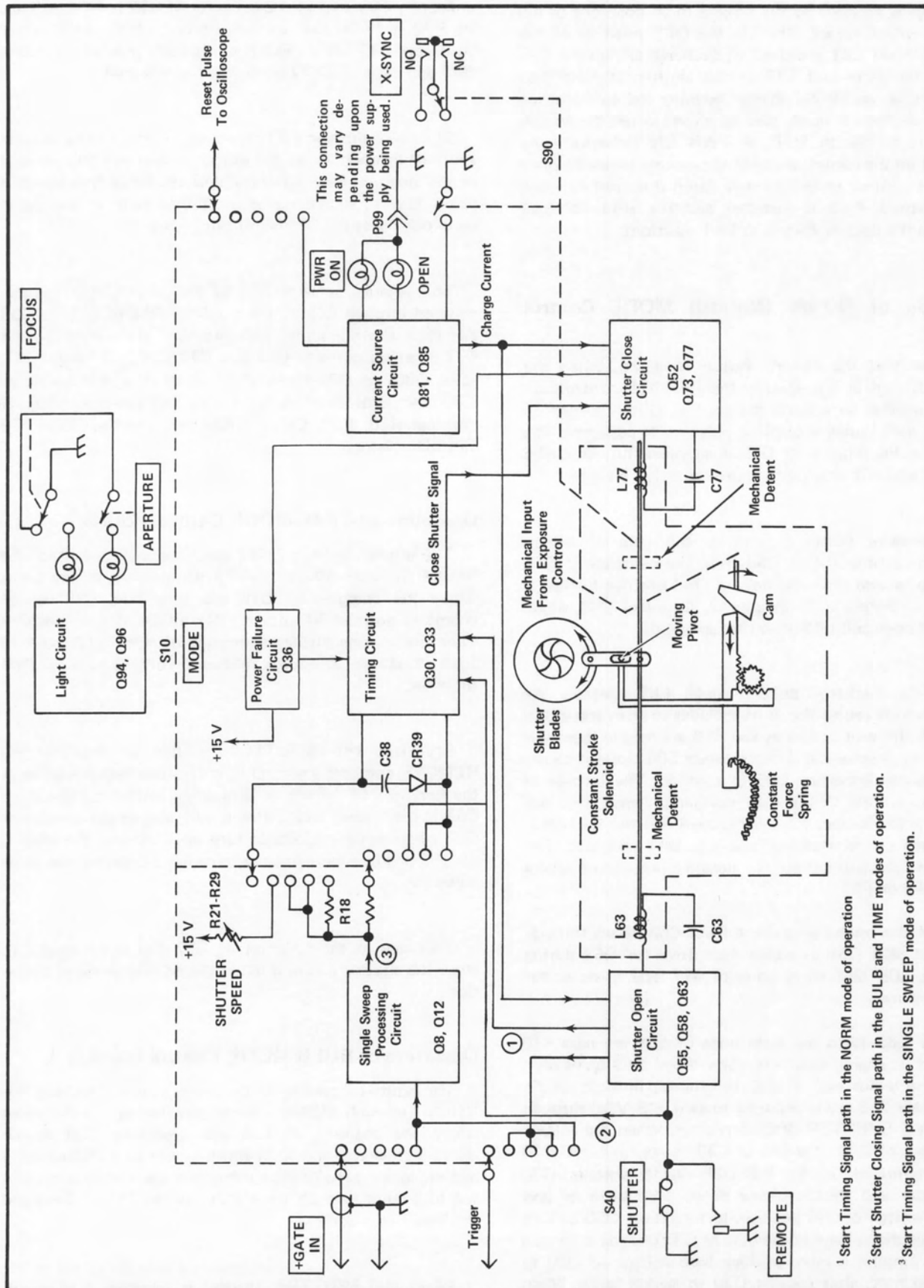
## ELECTRICAL DESCRIPTION

*Refer to the block diagram (Fig. 5-3) and the complete circuit diagram at the rear of the manual during the following circuit description.*

### General

+15 VDC to operate the Camera is supplied from either Tektronix 7000-series oscilloscope through its bezel or a separate external power supply.

<sup>1</sup>A beam-splitting mirror reflects only a percentage of the light striking it.



Voltage is supplied to the camera in all positions of the MODE control except OFF. In the OFF position of the MODE control C63 is caused to discharge along with C77 through the close coil L77 of the shutter solenoid thus preventing an accidental shutter opening and guaranteeing that the shutter, if open, will be closed when the MODE control is turned to OFF. A PWR ON indicator lamp mounted on the control panel of the camera indicates when voltage is applied to the camera (lamp does not function when Battery Pack is installed and the BAT-INT-EXT switch on the Battery Pack is in BAT position).

### Operation of NORM (Normal) MODE Control Position

Assume that the camera shutter is closed. When the SHUTTER control is pushed or the REMOTE contacts are shorted together to actuate the shutter, Q55 is turned on which in turn causes a positive pulse at its collector. The current for the emitter of Q55 is supplied through CR55 from C63 which is charged to approximately 15 volts.

The positive pulse applied to the gate of silicon controlled rectifier (SCR) Q58 from the collector of Q55 turns Q58 on and pulls the base of Q63 positive turning it on. C63 discharges through ground, transistor Q63, diode CR63 and open coil L63 of shutter solenoid.

The C63 discharge pulse through L63 operates the solenoid which causes the shutter blades to open and closes S90. Both the shutter blades and S90 are held in their new positions by mechanical detents. When S90 closes it causes current source transistor Q85 to turn on. The turn-on of Q85 turns on the OPEN indicator lamp (lamp does not function when Battery Pack is installed and the BAT-INT-EXT switch on the Battery Pack is in BAT position). The turn-on of Q63 also generates a negative pulse to provide a trigger pulse on P99.

Part of the discharge current from C63 passes through CR61 and SCR Q58 as added base drive for Q63 during switching. SCR Q58 stays on until Q77 later turns on for shutter closure.

Before Q63 turns on, both ends of C38 are near +15 VDC, and its charge near zero volts. When Q63 turns on it clamps the minus end of C38 to ground, through CR39. Immediately C38 starts charging toward +15 VDC through the selected SHUTTER SPEED resistor. When the voltage at the base of Q30 (the top of C38) is approximately 10 volts, determined by the R37-R38 divider voltage, Q30 base-emitter and CR32 voltage drops, Q30 turns on and pulls the emitter of Q52 positive, turning it on. Q30 turning on reduces the voltage at the base of Q33 causing it to turn on. Q33 supplies a more positive base voltage to Q30 to turn it on hard, thus causing Q30 to switch faster. When Q52 turns on, it momentarily creates a positive step at its

collector. This step at the collector of Q52 is differentiated by R70 and C70 and is used to turn on Q73 which in turn turns on Q77. C77 discharges through ground, transistor Q77 and close coil L77 of the shutter solenoid.

The pulse through L77 causes the shutter blades to close and S90 to open. Both the shutter blades and S90 are held in this position by mechanical detents. When S90 opens it causes current source transistor Q85 to turn off and thereby extinguishes the OPEN indicator lamp.

The negative pulse created by the turn-on of Q77 is also coupled through C69 to the anode of Q58 to turn off Q58 and Q63. Current source transistor Q81 is turned on by the C77 charging current. C63 and C77 charge through Q81. Q52, Q30 and Q33 eventually turn off when the voltage on C63 reaches approximately 14 volts. C38 can now discharge through R38, R37, CR37, CR34 and selected SHUTTER SPEED resistors.

### Operation of TIME MODE Control Position

The shutter opening is the same as was described for the NORM (normal) MODE control position up to the point where the charging of C38 was described. C38 cannot charge to positive 10 volts in TIME MODE control position since the voltage divider composed of R15, R17 and R19 fixes its charge at approximately 2 volts as soon as Q63 turns on.

Pressing the SHUTTER control or shorting the REMOTE contacts a second time creates a negative pulse at the base of Q55 (which no longer has emitter current since C63 is discharged and CR55 is off) and at the emitter of Q30 where it causes Q30 to turn on. Q30 pulls the emitter of Q52 positive momentarily, creating a positive step at its collector.

This step at the collector of Q52 causes the circuit to close the shutter just as it did in the NORM mode of operation.

### Operation of BULB MODE Control Position

The shutter opening is the same as was described for NORM (normal) MODE control position up to the point where the charging of C38 was described. C38 is not allowed to charge to a level which would turn Q30 on since as long as the SHUTTER control is pressed, R19 is connected to ground through the MODE control (S10), CR42 and the SHUTTER control.

When the SHUTTER control is released, R19 is ungrounded and C38 charges through R15 just as it is charged

through a shutter speed timing resistor in NORM mode. In 250 ms or less the base of Q30 reaches approximately 10 volts and turns on, turning on Q52 and causing the circuit to close the shutter just as it did in NORM mode of operation.

### Operation of SINGLE SWEEP MODE Control Position

The shutter opening is the same as was described for NORM (normal) MODE control position up to the point where the charging of C38 was described. In addition, the closing of S90 when the shutter opens, grounds the connector to the oscilloscope single sweep reset input causing the oscilloscope sweep to be reset if it is in the single sweep mode. (This applies only to those oscilloscopes designed for this feature). C38 can not charge since R19 is connected through the MODE control (S10) to the collector of Q63 which is now near ground. The voltage divider formed by R15, R17, and R19 puts the base of Q30 very near ground. (Q12 is turned off).

When the sweep on the oscilloscope starts and the + gate waveform goes positive, Q8 is turned on. Q8 turning on creates a negative pulse which is coupled through C10 to the gate of SCR Q12 where it has no effect. When the sweep on the oscilloscope has been completed, the + gate waveform falling from its positive level to its baseline level turns Q8 off. The + gate waveform transitions are coupled to P99 through the MODE control (S10) and C9 where they may be used for the triggering. The collector of Q8 rises, causing a positive pulse to be capacitively coupled through C10 to the gate of SCR Q12, turning it on. SCR Q12 turning on forward biases CR13, which starts C38 charging toward +15 VDC through timing resistor R18.

When the voltage at the top of C38 reaches approximately 10 volts, Q30 turns on which in turn turns on Q52, causing the circuit to close the shutter just as it did in NORM mode of operation.

### Operation of Light Circuit (SN B03000-up)

Transistors Q94 and Q96 comprise a voltage regulator circuit for the focus and photometer lights. Zener diode VR93 sets the output voltage of the regulator while CR97 and CR99 are steering diodes to prevent both lights from being on at the same time. The focus lights are turned on by pushing the FOCUS control in, while the photometer light is turned on by pushing the APERTURE control in.

C93 and C94 are normally discharged until their respective light control is operated. The charging of C93 or C94 controls the buildup of the lamp voltage preventing the cold lamp from drawing excessive starting current from the +15 V supply. R92 discharges C93 and R94 discharges C94 at a rate faster than the lamp cools off, when the light control is released.

### NOTE

*If the SHUTTER control is operated within 2 1/2 seconds of power removal (other than by turning the MODE control to OFF), the shutter may open and not reclose. In this case, restore power, then turn the MODE control to PWR OFF to close the shutter. The camera may then be turned on again.*

### Operation of Power Failure Circuits

If power to the Camera is interrupted, other than by turning the MODE control to PWR OFF, the camera shutter, if open, will be caused to close. This is accomplished by biasing Q36 such that as long as power to the camera is supplied, Q36 is turned off. When power is lost the +15 volts on the base of Q36 starts to drop. When it reaches a point where Q36 is turned on by the charge remaining in C77, Q36 turns on and couples a positive charge to the base of Q30. The turn on of Q30 causes the circuit to close the shutter just as it did in NORM mode of operation.

### NOTE

*The shutter assemblies on the C-52 and C-53 cameras are offset to accommodate lens assemblies different than either the C-51 or C-50 cameras. This offset requires the use of gears to couple the photometer to the shutter aperture adjust shaft. These parts are listed below:*

#### C-52

Description	Part Number	Quantity
Small Gear, Metal	401-0110-00	2
Large Gear, Metal	401-0111-00	1
Plate	407-0923-00	1
Shaft	384-0847-00	1
Retaining Ring	354-0163-00	1

#### C-53

Small Gear, Brass	401-0170-00	2
Large Gear, Fiber	401-0171-00	1
Bracket, Right Angle	386-2284-00	1
Plate, Gear	407-1105-00	1
Shaft	384-0847-00	1
Retaining Ring	354-0163-00	1
Spacer, Sleeve	361-0483-00	4



# SECTION 6

## CAMERA SYSTEM MAINTENANCE

### General Care of the Camera System

The Camera System should be given the same care as other precision optical devices. Care should be taken in handling the various mechanisms to insure that they are not damaged. The equipment should be kept covered when not in use to prevent dust accumulating on or in it.

### Camera Frame

The mirror used in the camera frame requires a minimum of maintenance. Normally, the only maintenance required is to keep the mirror clean. The mirror can be cleaned in the same manner as the Lenses. A soft, camel-hair brush can be used to remove loose dust after which fingerprints and smudges can be removed with clean, high-quality lens tissue.

### Lenses

In order to obtain maximum use from your camera, care should be taken that the lenses are kept clean and are properly installed in the shutter. When lenses require cleaning, the front and rear lens elements are easily unscrewed from the shutter housing, after removal of the film back to gain access to the rear lens element. When replacing the Lens elements, do not cross-thread or force the parts together. If the parts are mated properly, they will fit together easily. When tightening the lens elements, do not over-tighten, hand tight is sufficient.

Loose dust on lenses should be removed with a soft, camel-hair brush. Fingerprints and other smudges can be removed with clean, high-quality lens tissue. Be careful that you do not scratch the lenses when cleaning them.

Do not attempt to disassemble the lenses. The lens assemblies are sealed; therefore, dirt should not get on the inner surfaces of the lenses. Each lens is individually adjusted at the factory to obtain the correct magnification factor. If the lenses are disassembled and then reassembled, the magnification factor of the lens will probably be altered.

### Camera Backs

Polaroid film backs used with the Camera System should be inspected after each package of film is exposed and before more film is put in the camera. Any reagent on the rollers or other parts of the back should be removed immediately using a moist rag. If reagent is left on the rollers of the back, it may ruin some of the pictures.

### Visual Inspection

You should visually inspect all the electrical circuitry in the instrument every few months for possible circuit defects. These defects may include such things as loose or broken connections, damaged connectors, scorched wires or components, or broken terminals. For most visible troubles, the remedy is apparent; however, particular care must be taken when heat-damaged components are detected. Overheating of parts is often the result of other, less apparent defects. It is essential that you determine the cause of overheating before replacing heat-damaged parts, in order to prevent further damage.

## COMPONENT REPLACEMENT

### Light Leak Sealing

Some of the parts used in critical light leak areas of the camera have been sealed to adjoining parts with a black, pliable, non-hardening, weather stripping adhesive in place of any other light sealing material. If a light leak occurs or if one of the previously sealed parts is being replaced it is recommended that No. 2 Permatex<sup>1</sup>, 3M<sup>2</sup> weather strip adhesive No. 8011, or a material with similar characteristics be used as a light sealing material.

### Standard Parts

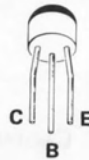
Many components in the instrument are standard electronic parts available locally. However, all parts can be obtained through your Tektronix Field Engineer or Field Office. Before purchasing or ordering, consult the parts list to determine the value, tolerance and rating required.

Fig. 6-1 shows lead configurations for the transistor and SCR types used.

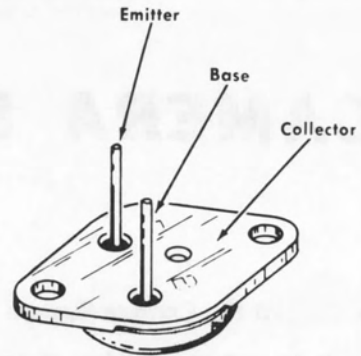
<sup>1</sup>Registered trademark of the Permatex Company, Inc.

<sup>2</sup>Registered trademark of the Minnesota Mining and Manufacturing Company.

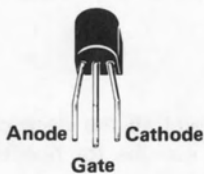
**NOTE**  
LEAD CONFIGURATIONS AND CASE STYLES ARE TYPICAL, BUT MAY VARY DUE TO VENDOR CHANGES OR INSTRUMENT MODIFICATIONS.



Plastic Case Transistors



Power Transistor



Plastic Case Silicon Controlled Rectifiers



Metal Case Transistors



Fig. 6-1. Transistor and SCR lead configurations used in C-50, C-51, or C-52 Camera.

## Special Parts

Some parts are manufactured or selected by Tektronix to satisfy particular requirements, or are manufactured for Tektronix to our specifications. These and most mechanical parts should be ordered directly from your Tektronix Field Engineer or Field Office. See Parts Ordering Information and Special Notes and Symbols at the front of Section 7.

## Soldering

### WARNING

*Disconnect the instrument from the power source and discharge capacitors C63 and C77 through a 100  $\Omega$ , 1/2 W resistor before soldering.*

**Metal Terminals.** When soldering metal terminals (e.g., interconnecting plug pins, switch terminals, potentiometers, etc.), ordinary 60/40 solder can be used. The soldering iron should have a 40- to 75-watt rating with a 1/8 inch wide chisel-shaped tip.

Observe the following precautions when soldering metal terminals:

1. Apply only enough heat to make the solder flow freely.

2. Apply only enough solder to form a solid connection. Excess solder may impair the function of the part.

3. If a wire extends beyond the solder point, clip the excess close to the joint.

4. Clean the flux from the solder joint with a flux-remover solvent to maintain good environmental characteristics.

**Circuit Boards.** Use ordinary 60/40 solder and a 15- to 30-watt pencil-type soldering iron on the circuit boards. A higher wattage soldering iron may separate the etched wiring from the base material.

The tip should be made of copper and have a chisel or beveled shape, with 1/8 inch width. The tip of the iron should be clean and properly tinned for best heat transfer to the solder joint.

The following technique should be used to replace a component on a circuit board:

1. Grip the component lead with long-nose pliers. Touch the soldering iron to the lead at the solder connection. Do not lay the iron directly on the board.

$\textcircled{\text{B}} \bar{1}$

2. When the solder begins to melt, pull the lead out gently. This should leave a clean hole in the board. If not, the hole can be cleaned by reheating the solder and placing a sharp object such as a toothpick into the hole to clean it out. A vacuum-type desoldering tool can also be used for this purpose. If the removal is not accomplished in the first few seconds of heat application, go to another connection or wait a few minutes before reheating the connection. This is to avoid transferring too much heat to the substrate.

3. Bend the leads of the new component to fit the holes in the board. Insert the leads into the holes in the board so the component is firmly seated against the board (or as positioned originally). Some components are mounted somewhat away from the board because they normally get quite hot. If the component does not seat properly, heat the solder and gently press the component into place.

4. Touch the iron in the connection and apply a small amount of solder to make a firm solder joint; do not apply too much solder. To protect heat-sensitive components, hold the lead between the component body and the solder joint with a pair of long-nose pliers or other heat sink.

5. Clean the area around the solder connection with a flux-remover solvent. Clip off any excessive lead length that protrudes through the board.

## Troubleshooting Aids

**Multi-pin Connector Color-Code.** The multi-pin wiring connectors used for connection to the circuit board are color coded to aid in circuit tracing and proper reconnection. The color of the connector body matches the resistor color-code for the last digit of the circuit number, e.g. P20 is black, P21 is brown.

## Packaging

**Original Packaging.** If the camera is to be shipped for long distances by commercial means of transportation, it is recommended that the camera be repackaged in the original manner for maximum protection. The original shipping carton can be saved and used for this purpose. Fig. 605 illustrates how to repackage the camera and gives the part numbers for the packaging components if new items are needed.

## Shutter Timing Resistor Selection

Resistors R21, R22, and R23 may be selected according to the table below. Larger than nominal values will make the shutter timing longer and smaller than nominal values will make the shutter timing shorter. Due to interaction, the fastest speed should be selected first.

Component	Nominal Value	Shutter Speed
R21	3.01 K	<u>60</u>
R22	2.67 K	<u>30</u>
R23	5.11 K	<u>15</u>

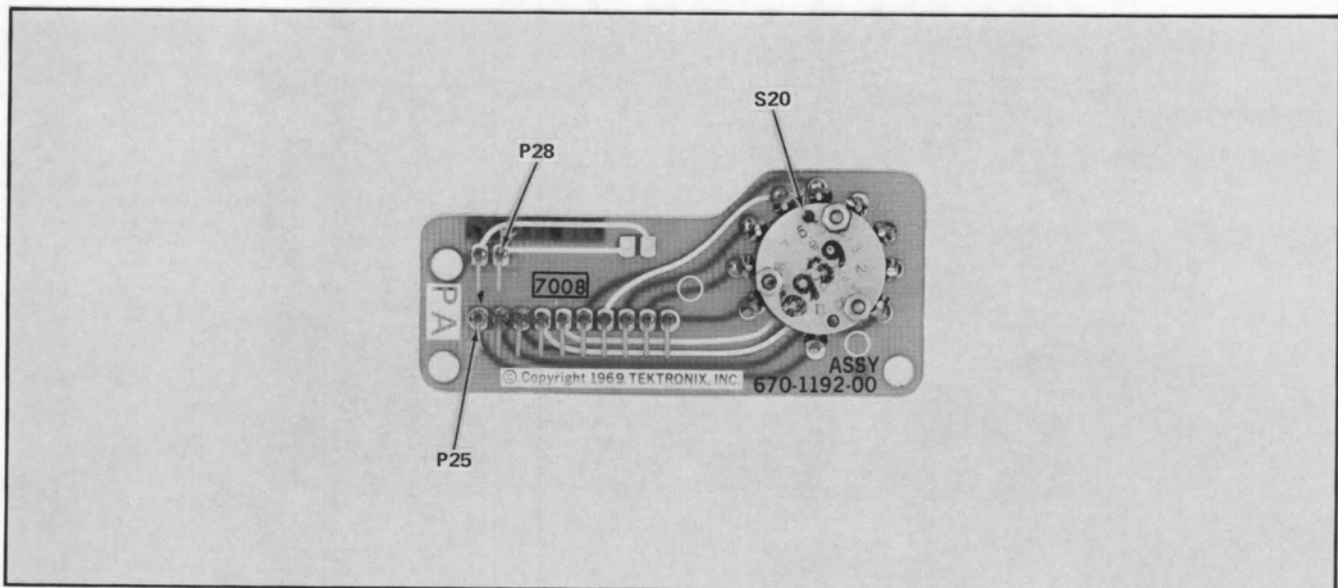


Fig. 6-3. Shutter Speed Switch circuit board; component identification.



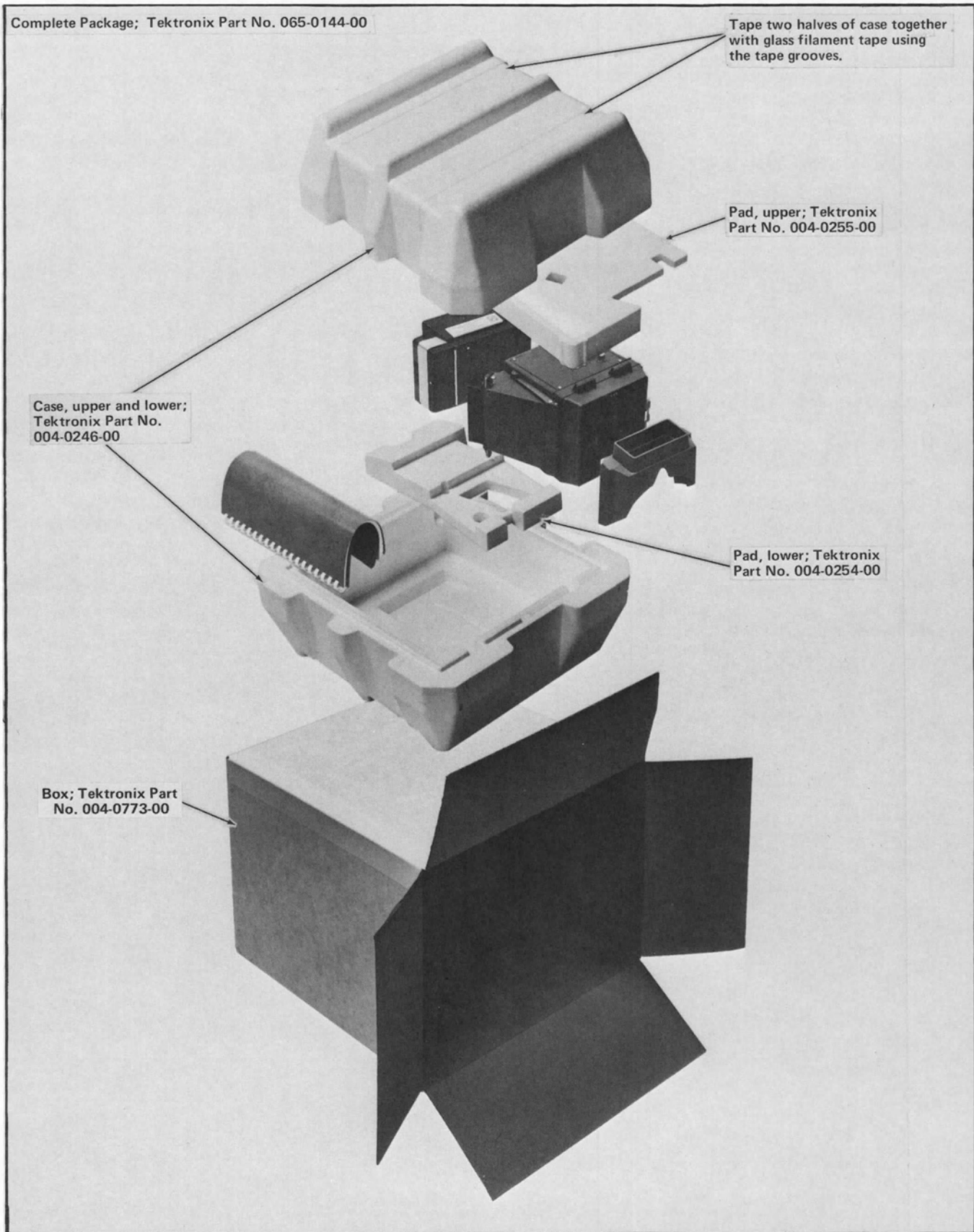


Fig. 6-4. Repackaging the Camera for shipment.

# SECTION 7

## PERFORMANCE CHECK

This Performance Check procedure permits verification of the camera's applicable electrical specifications as found in Section 1 of this manual. The equipment listed in Table 7-1, or equivalent equipment, is required to perform the Performance Check.

**Table 7-1**  
**Test Equipment Required**

Description	Example
Oscilloscope	Any TEKTRONIX 7000-Series Mainframe with appropriate plug-ins
DMM	TEKTRONIX DM 502 <sup>a</sup>
Oscilloscope probe	TEKTRONIX P6101
42-inch coaxial cable, bnc connectors	Tektronix Part No. 012-0057-01
Remote test cable	1/8-inch mini phone plug (Tektronix Part No. 134-0079-00) with any two conductor wire

<sup>a</sup> Requires TM 500 or TM 5000-Series Power Module.

### Procedure

a. Mount the camera on an operating 7000-Series Oscilloscope mainframe and open the viewing door.

b. Set the MODE switch to BULB. Verify that the green PWR ON lamp is on.

c. Press the FOCUS knob in and observe that both lights are on (looking at the CRT faceplate through the viewing door). Turn the FOCUS knob in until the focus lights are aligned, and release. Verify that the focus lights are now off.

d. Set the camera controls as follows:

MODE	BULB
FILM SPEED (ASA)	3200
SHUTTER SPEED	1/60
APERTURE	
C50, C52 & C53	16
C51	11

e. Press the APERTURE knob in and verify that the photometer lights turn on. Step the aperture down a few stops

and observe that the light gets dimmer with each successive stop. Return the aperture to the previous setting.

f. Press and hold the SHUTTER button. Observe that the shutter opens and the white OPEN light turns on. Note the approximate size of the aperture opening. Release the SHUTTER button and observe that the shutter closes fully and that the OPEN lamp goes off.

g. Set the APERTURE knob to 2.8. Press and hold the SHUTTER button. Verify that the shutter opens and that the aperture is significantly larger than in step f.

h. Set the MODE switch to TIME. Momentarily depress the SHUTTER button. Verify that the shutter is open and remains open until the SHUTTER button is depressed again.

i. Plug the Remote Test Cable into the REMOTE connector on the camera. Repeat step h by shorting the two wire leads together.

j. Disconnect the Remote Test Cable and reinstall it in the SYNC NO connector. Connect the DMM leads to the

## Performance Check — C-50 Series Cameras

Remote Test Cable leads. Set the DMM to 200 OHMS.

k. Check the SYNC connectors for the readings listed in Table 7-2 below:

**Table 7-2**  
**SYNC Connectors Ohmic Readings**

SYNC Connector	DMM Reading	
	SHUTTER closed	SHUTTER open
NO	>20 M $\Omega$	<5 ohms
NC	<5 ohms	>20 M $\Omega$

l. Remove the two screws from the circuit board cover inside the camera, and remove the cover. Pass the oscilloscope probe (connected to the oscilloscope) through the viewing window and connect it to TP52.

m. Set the oscilloscope as follows:

Vertical	
VERT MODE	CH1
VOLTS/DIV	.5V
AC-DC-GND	DC
BW	FULL
Triggering	
MODE	NORM
SOURCE	NORM
COUPLING	DC
SLOPE	negative
LEVEL	as required

n. Set the camera MODE to NORM.

o. Check the pulse width at TP52 for each of the Shutter Speeds as outlined in Table 7-3.

**Table 7-3**  
**Shutter Speeds**

SHUTTER SPEED (SEC)	Pulse Width
1/60	13 ms — 20 ms
1/30	26 ms — 39 ms
1/15	52 ms — 79 ms
1/8	100 ms — 150 ms
1/4	200 ms — 300 ms
1/2	400 ms — 600 ms
1	800 ms — 1.2 sec.
2	1.6 sec. — 2.4 sec.
4	3.2 sec. — 4.8 sec.

p. Disconnect the probe and replace the circuit board cover.

q. Connect a 42-inch bnc cable from the + GATE OUT on the oscilloscope to + GATE IN on the camera.

r. Set the oscilloscope TIME/DIV to 1 ms and TRIG MODE to AUTO.

s. Set the camera MODE to SINGLE SWEEP.

t. Trigger the shutter and verify that it closes within 5 seconds  $\pm 20\%$ .

u. Disconnect all cables.

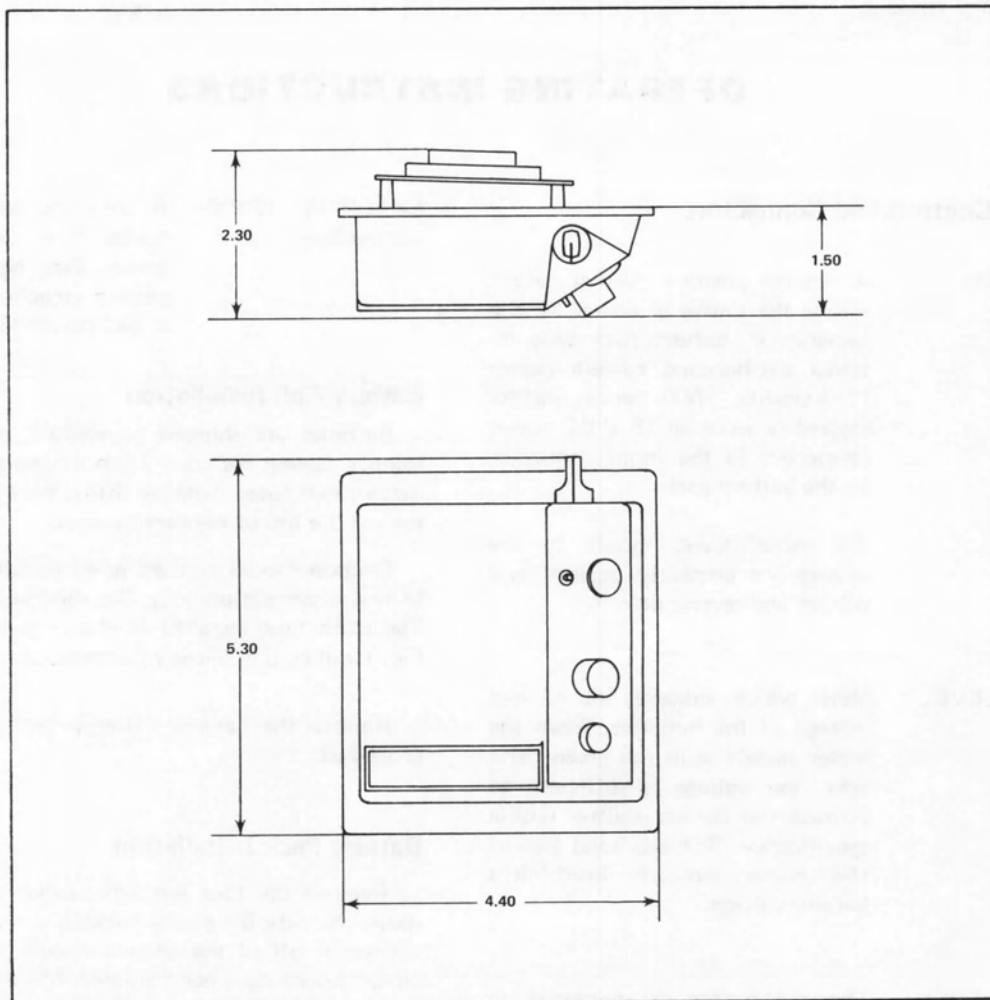
This completes the Performance Check procedure.

# **SECTION 8**

## **OPTIONAL BATTERY PACK**

### **Part No. 016-0270-02**

#### **SPECIFICATION**



**Fig. 1-1. Dimensions of the Battery Pack for the C-50, C-51, C-52 and C-53 Cameras.**

For use on C-50 Series cameras, (except C-58 and C-59) when camera is used on scopes that do not have bezel camera power.



## General Information

The battery pack (016-0270-02) is designed to provide an auxiliary power source for the use of C-50, C-51 and C-52 Cameras on oscilloscopes which are not equipped with camera power outputs. The battery pack provides for the camera to be powered from the oscilloscope camera power, battery pack power, or an external DC voltage source. All three power inputs to the camera from the battery pack are protected against over voltages and reverse polarity.

## ELECTRICAL CHARACTERISTICS

The electrical characteristics described in Table 1-1 are valid over the stated environmental range for the C-50, C-51 and C-52 Cameras.

TABLE 1-1

Characteristic	Performance Requirement
Batteries	
Type	AA Alkaline cell
Number of Cells	12
Nominal Voltage per Cell	1.5 V
Capacity	1100 mAh
Power Supply Potential (No load)	13 to 18 volts dependent upon battery condition
External Input Jack	Protected against reverse polarity and potentials over +22 volts (within 5%)

## OPERATING INSTRUCTIONS

### Operating Controls and Connectors

**BAT-INT-EXT** A three position switch which selects the source of power for the camera, i.e., battery pack cells, internal oscilloscope camera power (Tektronix 7000 series oscilloscopes) or external 15 V DC power connected to the input connector on the battery pack.

All three power inputs to the camera are protected against over voltage and reverse polarity.

**BATTERY LEVEL (meter)** Meter which indicates the no-load voltage of the batteries. When the meter needle is in the green band area, the voltage is sufficient to operate the camera shutter within specification. The red band area of the meter indicates insufficient battery voltage.

**BATTERY LEVEL (pushbutton)** The pushbutton is depressed to activate battery level meter.

**Fuse (inside)** Fuse for protecting camera circuitry from all battery pack power inputs. The battery pack protection circuits are designed to blow the fuse if trouble occurs.

**EXTERNAL 15 V DC (connector)** A 3-pin female connector which mates with male connector (Tektronix Part No. 131-0716-00) to allow connection of an external 15 V DC power source to the camera.

### Battery Cell Installation

Batteries are shipped uninstalled, to install proceed as follows. Swing the cover latch to one side and remove the battery cell cover plate by lifting the cover out slightly and toward the top of the battery pack.

Caution should be used when installing the battery cells to insure correct polarity. See mechanical parts list Fig. 1. The cloth tape installed as shown in mechanical parts list Fig. 1 will help in battery cell removal.

Replace the battery cell cover by reversing the removal procedure.

### Battery Pack Installation

Remove the four left side camera cover screws and remove the side by gently rocking it to inch the side cover connector off of the camera circuit board. If the camera circuit board does get dislodged from its position, re-install it.

Install the battery pack by lining up the battery pack circuit board connector with the mating part of the camera circuit board. Work the battery pack toward the camera frame until it is against the camera. Install the four screws removed from the previous cover.

## FUNCTIONAL DESCRIPTION

### ELECTRICAL DESCRIPTION

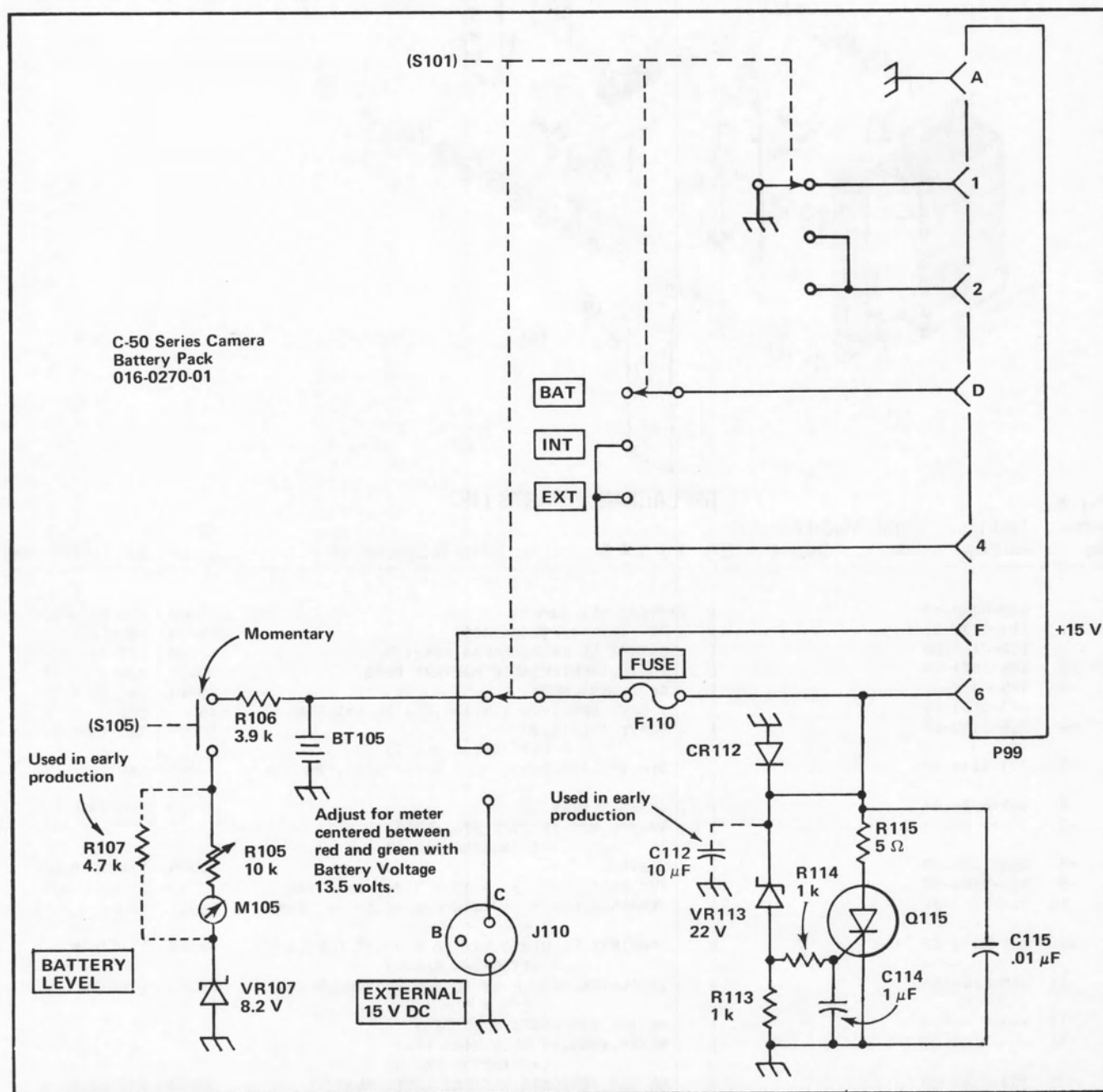
Refer to the complete circuit diagram for the battery pack at the rear of the manual during the following circuit description.

The battery level check circuitry consists of zener VR107, meter M105, adjustment pot R105, pushbutton S105, and resistor R106. R106 limits current through M105 if R105 is set to a low resistance value. R105 is adjusted so that M105 is between red and green with 13.5 volts on the battery terminals.

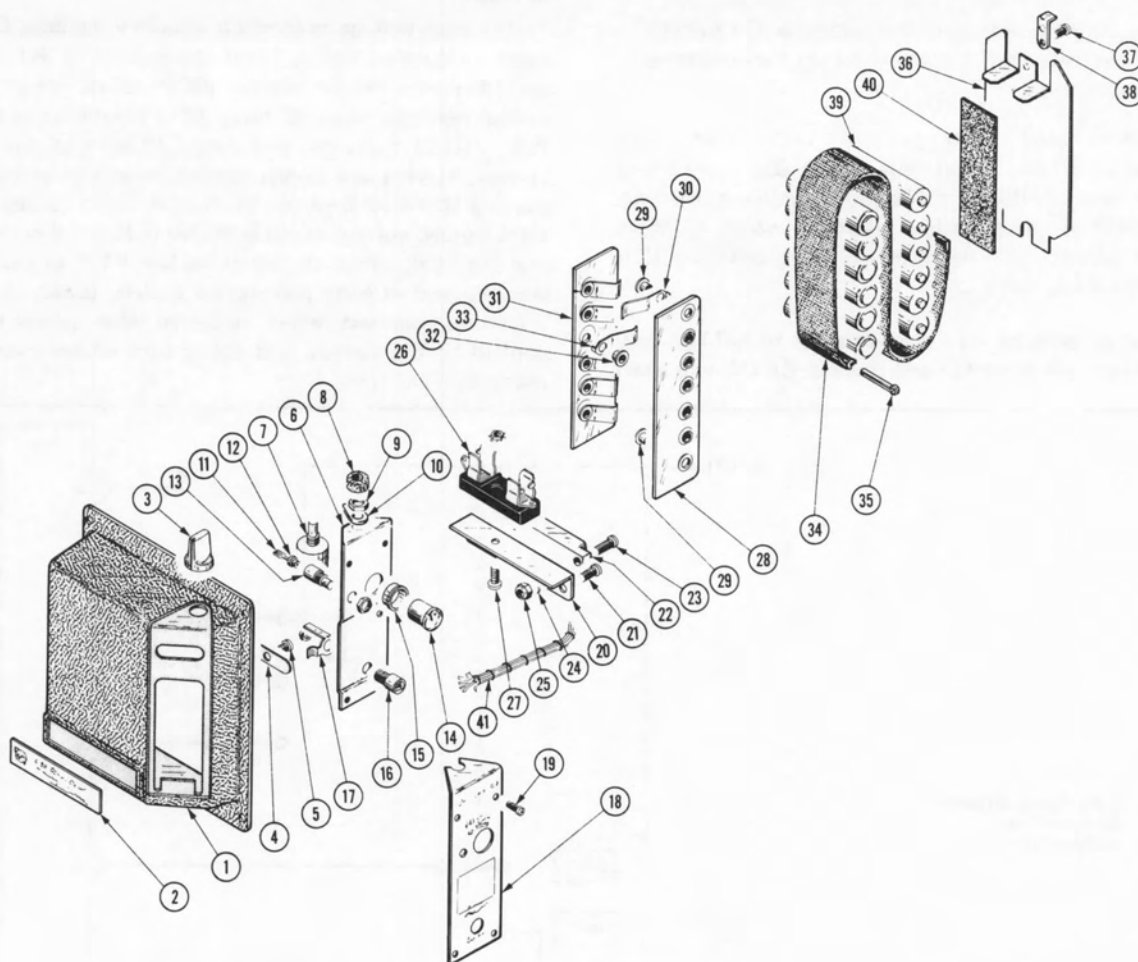
The reverse polarity circuitry consists of CR112 connected between pin 6 of P99 and ground. CR112 will short

any reverse polarity voltage to ground and cause fuse F110 to blow.

The over-voltage protection circuitry includes C112 (in early production only), Zener Diode VR113, R113, R115 and silicon-controlled rectifier (SCR) Q115. When an over-voltage (greater than 22 volts,  $\pm 5\%$ ) is applied to pin 6 of P99, VR113 turns on, and drops 22 volts of the applied voltage, leaving any excess voltage developed across R113, causing Q115 to turn on. With SCR Q115 turned on, the total applied voltage at pin 6 of P99 is dropped across R115 and the SCR, which should cause fuse F110 to blow. C112 was required in early production battery packs, to prevent a turn-on transient, which occurred when power was first applied to the camera and could turn on the over-voltage protection circuitry.



# MECHANICAL PARTS LIST



## REPLACEABLE PARTS LIST

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
	016-0270-02		1						BATTERY SET:CAMERA	80009	016-0270-02
-1	380-0236-01		1						. HSG,BATTERY:BLACK ABS	80009	380-0236-01
	122-0764-00		1						. GASKET,LT SHLD:CAMERA ADAPTER	80009	122-0764-00
-2	334-1685-02		1						. PLATE,IDENT:MARKED BATTERY PACK	80009	334-1685-01
-3	366-0379-00		1						. KNOB:GRAY,MODE	80009	366-0379-00
	213-0153-00		1						. SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-4	386-1940-00		1						. PLATE,RETAINING: (ATTACHING PARTS)	80009	386-1940-00
-5	213-0138-00		1						. SCR,TPG,THD FOR:4-40 X 0.188 INCH,PNH STL	83385	OBD
-6	441-0986-00		1						. CHASSIS,BTRY SE:	80009	441-0986-00
-7	-----		1						. SWITCH,ROTARY:(SEE S101 EPL) (ATTACHING PARTS)		
-8	214-1288-00		1						. GASKET:	80009	214-1288-00
-9	210-0583-00		1						. NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
-10	210-0223-01		1						. TERMINAL,LUG:0.25 INCH DIA,SE,60 DEG BEND	86928	OBD
-11	131-0433-00		8						. TERMINAL,FEEDTH:0.057 ID X 0.42" LONG,BRS (ATTACHING PARTS)	88245	421572-9
-12	358-0241-00		8						. INSULATOR,BSHG:0.05 ID X 0.125" OD,W/FLGE (ATTACHING PARTS)	88245	421565
-13	-----		1						. SWITCH,PUSH:(SEE S105 EPL)		
-14	-----		1						. METER,BTRY,LVL(SEE M105 EPL) (ATTACHING PARTS)		
-15	352-0243-00		1						. HOLDER,INDICATR:BATTERY LEVEL,PLASTIC (ATTACHING PARTS)	80009	352-0243-00

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
-16	131-0717-00		1	.	CONNECTOR, RCPT, :PWR, FEMALE, 125 VAC, 3A (ATTACHING PARTS)	81312	SM3SN TY34
-17	214-1537-00		1	.	HEAT SINK, SCR: - - - * - - -	80009	214-1537-00
	131-0716-00		1	.	CONN, RCPT, ELEC: 3 CONTACT, MALE	80009	131-0716-00
-18	333-1407-00		1	.	PANEL, FRONT: (ATTACHING PARTS)	80009	333-1407-00
-19	213-0055-00		3	.	SCR, TPG, THD FOR: 2-32 X 0.188 INCH, PNH STL	93907	OBD
	213-0138-00		1	.	SCR, TPG, THD FOR: 4-40 X 0.188 INCH, PNH STL - - - * - - -	83385	OBD
-20	407-0941-00		1	.	BRACKET, ANGLE: ALUMINUM (ATTACHING PARTS)	80009	407-0941-00
-21	213-0138-00		2	.	SCR, TPG, THD FOR: 4-40 X 0.188 INCH, PNH STL - - - * - - -	83385	OBD
-22	131-0581-00		1	.	CONNECTOR, RCPT, :12 FEMALE CONTACTS (ATTACHING PARTS)	05574	2VH6/21AN5
-23	211-0014-00		2	.	SCREW, MACHINE: 4-40 X 0.50 INCH, PNH STL	83385	OBD
-24	210-0994-00		2	.	WASHER, FLAT: 0.125 ID X 0.25" OD, STL	86928	5714-147-20N
-25	210-0589-00		2	.	NUT, SELF LKG HE: 4-40 X 0.250 INCH - - - * - - -	13257	22 NM-40
-26	352-0031-00		1	.	FUSEHOLDER: 3AG FUSE (ATTACHING PARTS)	75915	357001
-27	213-0054-00		1	.	SCR, TPG, THD FOR: 6-32 X 0.312 INCH, PNH STL - - - * - - -	93907	OBD
-28	670-1366-00		1	.	CKT BOARD ASSY: BATTERY PACK, RIGHT	80009	670-1366-00
-29	210-0778-01		7	.	EYELET, METALLIC: 0.163 OD X 0.15 INCH L, BRS	80009	210-0778-01
-30	131-1029-01		6	.	CONTACT, ELEC: BATTERY, NI BE	80009	131-1029-01
-31	670-1367-00		1	.	CKT BOARD ASSY: BATTERY PACK, LEFT	80009	670-1367-00
-32	210-0778-01		6	.	EYELET, METALLIC: 0.163 OD X 0.15 INCH L, BRS	80009	210-0778-01
-33	131-1029-01		6	.	CONTACT, ELEC: BATTERY, NI BE	80009	131-1029-01
-34	214-1538-00		1	.	PULL TAPE, BTRY:	80009	214-1538-00
-35	214-1549-00		1	.	PIN, COTTER:	80009	214-1549-00
-36	200-1206-00		1	.	COVER, BTRY SET: (ATTACHING PARTS)	80009	200-1206-00
-37	213-0138-00		1	.	SCR, TPG, THD FOR: 4-40 X 0.188 INCH, PNH STL	83385	OBD
-38	105-0254-00		1	.	CATCH, FRICTION: - - - * - - -	80009	105-0254-00
-39	-----		12	.	BATTERY, DRY:		
	-----		-	.	(BATTERIES NOT INCLUDED WITH UNIT.)		
	-----		-	.	(SEE TABLE 1-1)		
-40	124-0247-00		1	.	PLASTIC STRIP:	80009	124-0247-00
-41	179-1634-01		1	.	WIRING HARNESS, :MAIN	80009	179-1634-01
STANDARD ACCESSORIES							
	159-0025-00		2	.	FUSE, CARTRIDGE: 3AG, 0.5A, 250V, FAST-BLOW	71400	AGC 1/2
	062-4090-00		1	.	DATA SHEET: 016-0270-02	80009	062-4090-00
OPTIONAL ACCESSORIES							
	146-0025-00		12	.	BATTERY, DRY: 1.5V F CELL	14832	#E-91

## CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
000CY	NORTHWEST FASTENER SALES, INC.	7923 SW CIRRU DRIVE	BEAVERTON, OREGON 97005
05574	VIKING INDUSTRIES, INC.	21001 NORDHOFF STREET	CHATSWORTH, CA 91311
13257	AMERACE, LTD.	10 ESNA PARK DRIVE	MARKHAM, ONTARIO, CANADA
71400	BUSSMAN MFG., DIVISION OF MCGRAW-EDISON CO.	2536 W. UNIVERSITY ST.	ST. LOUIS, MO 63107
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
75915	LITTELFUSE, INC.	800 E. NORTHWEST HWY	DES PLAINES, IL 60016
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
81312	WINCHESTER ELECTRONICS DIVISION		
	LITTON INDUSTRIES, INC.	MAIN ST. AND HILLSIDE AVE.	OAKVILLE, CT 06779
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
86928	SEASTROM MFG. COMPANY, INC.	701 SONORA AVENUE	GLENDALE, CA 91201
88245	LITTON SYSTEMS, INC., USECO DIV.	13536 SATICOY ST.	VAN NUYS, CA 91409
93907	CAMCAR SCREW AND MFG. CO.	600 18TH AVE.	ROCKFORD, IL 61101



# ELECTRICAL PARTS LIST

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C114	290-0267-00			CAP., FXD, ELCTLT: 1UF, 20%, 35V	56289	162D105X0035CD2
C115	283-0002-00			CAP., FXD, CER DI: 0.01UF, +80-20%, 500V	72982	811-546E103Z
CR112	152-0066-00			SEMICOND DEVICE: SILICON, 400V, 750MA	80009	152-0066-00
F110	159-0025-00			FUSE, CARTRIDGE: 3AG, 0.5A, 250V, FAST-BLOW	71400	AGC 1/2
M105	149-0044-02			METER, BAT LEVEL: 1MA, 345 OHMS, 0.5 DIA	0000M	MC-12M
Q115	151-0503-00			SCR: SILICON, TO-92	04713	2N5060
R105	311-1559-00			RES., VAR, NONWIR: 10K OHM, 20%, 0.50W	73138	91A-10001M
R106	315-0392-00			RES., FXD, CMPSN: 3.9K OHM, 5%, 0.25W	01121	CB3925
R113	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R114	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R115	308-0555-00			RES., FXD, WW: 5 OHM, 5%, 3W	00213	1200S-5R000J
S101	260-1220-00			SWITCH, ROTARY: BATTERY PACK	80009	260-1220-00
S105	260-0735-00			SWITCH, PUSH: SPST	81073	39-1
VR107	152-0217-00			SEMICOND DEVICE: ZENER, 0.4W, 8.2V, 5%	80009	152-0217-00
VR113	152-0281-00			SEMICOND DEVICE: ZENER, 0.4W, 22V, 5%	04713	1N969B

## CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
0000M	SONY/TEKTRONIX CORPORATION	P O BOX 14, HANEDA AIRPORT	TOKYO 149, JAPAN
00213	NYTRONICS, COMPONENTS GROUP, INC., SUBSIDIARY OF NYTRONICS, INC.	ORANGE STREET	DARLINGTON, SC 29532
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD, PO BOX 20923	PHOENIX, AZ 85036
56289	SPRAGUE ELECTRIC CO.		NORTH ADAMS, MA 01247
71400	BUSSMAN MFG., DIVISION OF MCGRAW- EDISON CO.	2536 W. UNIVERSITY ST.	ST. LOUIS, MO 63107
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
81073	GRAYHILL, INC.	561 HILLGROVE AVE., PO BOX 373	LA GRANGE, IL 60525

# REPLACEABLE ELECTRICAL PARTS

## PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

## SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number  
00X Part removed after this serial number

## ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

## ABBREVIATIONS

ACTR	ACTUATOR	PLSTC	PLASTIC
ASSY	ASSEMBLY	QTZ	QUARTZ
CAP	CAPACITOR	RECP	RECEPTACLE
CER	CERAMIC	RES	RESISTOR
CKT	CIRCUIT	RF	RADIO FREQUENCY
COMP	COMPOSITION	SEL	SELECTED
CONN	CONNECTOR	SEMICOND	SEMICONDUCTOR
ELCTLT	ELECTROLYTIC	SENS	SENSITIVE
ELEC	ELECTRICAL	VAR	VARIABLE
INCAND	INCANDESCENT	WW	WIREWOUND
LED	LIGHT EMITTING DIODE	XFMR	TRANSFORMER
NONWIR	NON WIREWOUND	XTAL	CRYSTAL

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
00853	SANGAMO MESTON INC	SANGAMO RD	PICKENS SC 29671
	SANGAMO CAPACITOR DIV	P O BOX 128	
01121	ALLEN-BRADLEY CO	1201 SOUTH 2ND ST	MILWAUKEE WI 53204
03508	GENERAL ELECTRIC CO	M GENESEE ST	AUBURN NY 13021
	SEMI-CONDUCTOR PRODUCTS DEPT		
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH	MYRTLE BEACH SC 29577
		P O BOX 867	
04713	MOTOROLA INC	5005 E MCDOWELL RD	PHOENIX AZ 85008
	SEMICONDUCTOR GROUP		
05397	UNION CARBIDE CORP MATERIALS SYSTEMS	11901 MADISON AVE	CLEVELAND OH 44101
	DIV		
05574	VIKING CONNECTORS INC	21001 NORDHOFF ST	CHATHAM NORTH CA 91311
05828	GENERAL INSTRUMENT CORP	600 M JOHN ST	HICKSVILLE NY 11802
	GOVERNMENT SYSTEMS DIV		
08806	GENERAL ELECTRIC CO	NELA PK	CLEVELAND OH 44112
	MINIATURE LAMP PRODUCTS DEPT		
14433	ITT SEMICONDUCTORS DIV		WEST PALM BEACH FL
19701	MEPCO/ELECTRA INC	P O BOX 760	MINERAL WELLS TX 76067
	A NORTH AMERICAN PHILIPS CO		
22753	UID SWITCHES INC	6615 M IRVING PARK RD	CHICAGO IL 60634
	DIV OF ILLINOIS TOOL WORKS INC		
23880	STANFORD APPLIED ENGINEERING INC	340 MARTIN AVE	SANTA CLARA CA 95050
24931	SPECIALTY CONNECTOR CO INC	2620 ENDRESS PLACE	GREENWOOD IN 46142
		P O BOX 0	
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051
31433	UNION CARBIDE CORP	PO BOX 5928	GREENVILLE SC 29606
	ELECTRONICS DIV		
52763	STETTNER ELECTRONICS INC	6135 AIRWAYS BLVD	CHATTANOOGA TN 37421
		PO BOX 21947	
56289	SPRAGUE ELECTRIC CO	87 MARSHALL ST	NORTH ADAMS MA 01247
57668	ROHM CORP	16931 MILLIKEN AVE	IRVINE CA 92713
58361	GENERAL INSTRUMENT CORP	3400 HILLVIEW AVE	PALO ALTO CA 94304
	OPTOELECTRONICS DIV		
59660	TUSONIX INC	2155 N FORBES BLVD	TUCSON, ARIZONA 85705
59821	CENTRALAB INC	7158 MERCHANT AVE	EL PASO TX 79915
	SUB NORTH AMERICAN PHILIPS CORP		
71400	MCGRAW HILL CO	502 EARTH CITY PLAZA	ST LOUIS MO 63178
	BUSSMANN MFG DIV	P O BOX 14460	
75042	TRM INC	401 N BROAD ST	PHILADELPHIA PA 19108
	TRM ELECTRONIC COMPONENTS		
	IRC FIXED RESISTORS PHILADELPHIA DIV		
76493	BELL INDUSTRIES INC MILLER J M DIV	19070 REYES AVE	COMPTON CA 90224
		P O BOX 5825	
80009	TEKTRONIX INC	4900 S M GRIFFITH DR	BEAVERTON OR 97077
		P O BOX 500	
82389	SWITCHCRAFT INC	5555 N ELSTON AVE	CHICAGO IL 60630
	SUB OF RAYTHEON CO		
91637	DALE ELECTRONICS INC	P O BOX 609	COLUMBUS NE 68601
91929	HONEYWELL INC	11 M SPRING ST	FREEPORT IL 61032
	MICRO SWITCH DIV		

Replaceable Electrical Parts  
C-50 Series Camera

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A1	670-1135-00			CIRCUIT BD ASSY:SHUTTER CONTROL	80009	670-1135-00
A1C3	281-0525-00	8040000		CAP,FXD,CER D1:470PF,+/-94PF,500V	52763	2R0PLZ007 470PM0
A1C9	281-0549-00			CAP,FXD,CER D1:68PF,10%,500V	52763	2R0PLZ007 68P0KU
A1C10	283-0054-00			CAP,FXD,CER D1:150PF,5%,200V	59660	855-535 U2J0151J
A1C13	283-0180-00	8030000		CAP,FXD,CER D1:5600PF,20%,200V	04222	3429 200E 562M
A1C38	285-0895-00			CAP,FXD,PLASTIC:1.0UF,3%,25V	80009	285-0895-00
A1C40	283-0000-00			CAP,FXD,CER D1:0.001UF,+100-0%,500V	59660	831-610-Y5U0102P
A1C43	283-0003-00			CAP,FXD,CER D1:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDC EX
A1C44	283-0178-00			CAP,FXD,CER D1:0.1UF,+80-20%,100V	05397	C330C104Z1U1CA
A1C46	290-0183-00			CAP,FXD,ELCTLT:1UF,10%,35V	05397	T3228105K035AS
A1C48	283-0032-00	8010100	8029999	CAP,FXD,CER D1:470PF,5%,500V	59660	831-000-Z5E0471J
A1C48	283-0197-00	8030000		CAP,FXD,CER D1:470PF,5%,50V	04222	SR205A471JAA
A1C69	283-0026-00	8010100	8029999	CAP,FXD,CER D1:0.2UF,+80-20%,25V	31433	C330C204M5R5CA
A1C69	283-0203-00	8030000		CAP,FXD,CER D1:0.47UF,20%,50V	04222	SR3055C474MAA
A1C70	290-0301-00			CAP,FXD,ELCTLT:10UF,10%,20V	05397	T110B106K020AS
A1C91	290-0183-00			CAP,FXD,ELCTLT:1UF,10%,35V	05397	T3228105K035AS
A1C92	290-0215-00	8071756		CAP,FXD,ELCTLT:100UF,+75-10%,25V (C-50 ONLY)	56289	30D107G025009
A1C92	290-0215-00	8072332	8094628	CAP,FXD,ELCTLT:100UF,+75-10%,25V (C-51 ONLY)	56289	30D107G025009
A1C92	290-0215-00	8070650		CAP,FXD,ELCTLT:100UF,+75-10%,25V (C-52 ONLY)	56289	30D107G025009
A1C92	290-0215-00	8071748	8095609	CAP,FXD,ELCTLT:100UF,+75-10%,25V (C-53 ONLY)	56289	30D107G025009
A1C93	290-0301-00			CAP,FXD,ELCTLT:10UF,10%,20V	05397	T110B106K020AS
A1C94	290-0301-00			CAP,FXD,ELCTLT:10UF,10%,20V	05397	T110B106K020AS
A1CR3	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR6	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR11	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR13	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR32	152-0246-00			SEMICON DVC,D1:SM,S1,40V,200MA,DO-7	14433	MG1537TK
A1CR34	152-0246-00			SEMICON DVC,D1:SM,S1,40V,200MA,DO-7	14433	MG1537TK
A1CR36	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR37	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR38	152-0246-00			SEMICON DVC,D1:SM,S1,40V,200MA,DO-7	14433	MG1537TK
A1CR39	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR42	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR43	152-0141-02	8030000		SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR48	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR49	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR55	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR61	152-0066-00			SEMICON DVC,D1:RECT,S1,400V,1A,DO-41	05828	GP10G-020
A1CR71	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR72	152-0066-00			SEMICON DVC,D1:RECT,S1,400V,1A,DO-41	05828	GP10G-020
A1CR73	152-0066-00			SEMICON DVC,D1:RECT,S1,400V,1A,DO-41	05828	GP10G-020
A1CR74	152-0066-00			SEMICON DVC,D1:RECT,S1,400V,1A,DO-41	05828	GP10G-020
A1CR79	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR80	152-0066-00			SEMICON DVC,D1:RECT,S1,400V,1A,DO-41	05828	GP10G-020
A1CR85	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR89	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR91	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR92	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR94	152-0141-02	8030000		SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR95	152-0141-02	8030000		SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR97	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR99	152-0141-02			SEMICON DVC,D1:SM,S1,30V,150MA,30V	03508	DA2527 (1N4152)
A1Q8	151-0224-00			TRANSISTOR:NPN,S1,TO-92	04713	SPS6917
A1Q12	151-0503-00			SCR:S1,TO-92	04713	SCR5138
A1Q30	151-0192-00			TRANSISTOR:SELECTED	04713	SPS8801
A1Q33	151-0216-00			TRANSISTOR:PMP,S1,TO-92	04713	SPS8803



Replaceable Electrical Parts  
C-50 Series Camera

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A1Q36	151-0289-00			TRANSISTOR:PMP,SI,TO-18	04713	SS106
A1Q52	151-0188-00			TRANSISTOR:PMP,SI,TO-92	80009	151-0188-00
A1Q55	151-0188-00			TRANSISTOR:PMP,SI,TO-92	80009	151-0188-00
A1Q58	151-0503-00			SCR:SI,TO-92	04713	SCR5138
A1Q73	151-0260-00			TRANSISTOR:NPN,SI,TO-39	04713	ST1083
A1Q81	151-0208-02			TRANSISTOR:PMP,SI,TO-39	27014	2N4036
A1Q85	151-0188-00			TRANSISTOR:PMP,SI,TO-92	80009	151-0188-00
A1Q94	151-0224-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS6917
A1Q96	151-0260-00			TRANSISTOR:NPN,SI,TO-39	04713	ST1083
A1R3	315-0562-00	8010100	8039999	RES,FXD,FILM:5.6K OHM,5%,0.25M	57668	NTR25J-E05K6
A1R3	315-0222-00	8040000		RES,FXD,FILM:2.2K OHM,5%,0.25M	57668	NTR25J-E02K2
A1R5	315-0472-00	8010100	8039999	RES,FXD,FILM:4.7K OHM,5%,0.25M	57668	NTR25J-E04K7
A1R5	315-0471-00	8040000		RES,FXD,FILM:470 OHM,5%,0.25M	57668	NTR25J-E470E
A1R6	315-0104-00			RES,FXD,FILM:100K OHM,5%,0.25M	57668	NTR25J-E100K
A1R8	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25M	19701	5043CX10K00J
A1R11	315-0104-00			RES,FXD,FILM:100K OHM,5%,0.25M	57668	NTR25J-E100K
A1R12	315-0301-00	8030000		RES,FXD,FILM:300 OHM,5%,0.25M	57668	NTR25J-E300E
A1R15	315-0393-00			RES,FXD,FILM:39K OHM,5%,0.25M	57668	NTR25J-E39K0
A1R17	315-0753-00			RES,FXD,FILM:75K OHM,5%,0.25M	57668	NTR25J-E75K0
A1R18	315-0624-00			RES,FXD,FILM:620K OHM,5%,0.25M	19701	5043CX620K0J
A1R19	315-0222-00			RES,FXD,FILM:2.2K OHM,5%,0.25M	57668	NTR25J-E02K2
A1R21	321-0231-00			RES,FXD,FILM:2.49K OHM,1%,0.125M,TC=TO (C-50,C-52 ONLY)	19701	5033ED2K49F
A1R21	321-0231-00	8010100	8095199	RES,FXD,FILM:2.49K OHM,1%,0.125M,TC=TO (C-51 ONLY)	19701	5033ED2K49F
A1R21	321-0243-00	8095200		RES,FXD,FILM:3.32K OHM,1%,0.125M,TC=TO (C-51 ONLY)	19701	5033ED3K32F
A1R21	321-0231-00	8010100	8096399	RES,FXD,FILM:2.49K OHM,1%,0.125M,TC=TO (C-53 ONLY)	19701	5033ED2K49F
A1R21	321-0243-00	8096400		RES,FXD,FILM:3.32K OHM,1%,0.125M,TC=TO (C-53 ONLY)	19701	5033ED3K32F
A1R22	321-0231-00			RES,FXD,FILM:2.49K OHM,1%,0.125M,TC=TO (C-50,C-52 ONLY)	19701	5033ED2K49F
A1R22	321-0231-00	8010100	8095199	RES,FXD,FILM:2.49K OHM,1%,0.125M,TC=TO (C-51 ONLY)	19701	5033ED2K49F
A1R22	321-0234-00	8095200		RES,FXD,FILM:2.67K OHM,1%,0.125M,TC=TO (C-51 ONLY)	19701	5033ED2K67F
A1R22	321-0231-00	8010100	8096399	RES,FXD,FILM:2.49K OHM,1%,0.125M,TC=TO (C-53 ONLY)	19701	5033ED2K49F
A1R22	321-0234-00	8096400		RES,FXD,FILM:2.67K OHM,1%,0.125M,TC=TO (C-53 ONLY)	19701	5033ED2K67F
A1R23	321-0260-00			RES,FXD,FILM:4.99K OHM,1%,0.125M,TC=TO (C-50,C-52 ONLY)	19701	5033ED4K990F
A1R23	321-0260-00	8010100	8095199	RES,FXD,FILM:4.99K OHM,1%,0.125M,TC=TO (C-51 ONLY)	19701	5033ED4K990F
A1R23	321-0261-00	8095200		RES,FXD,FILM:5.11K OHM,1%,0.125M,TC=TO (C-51 ONLY)	19701	5033ED5K110F
A1R23	321-0260-00	8010100	8096399	RES,FXD,FILM:4.99K OHM,1%,0.125M,TC=TO (C-53 ONLY)	19701	5033ED4K990F
A1R23	321-0261-00	8096400		RES,FXD,FILM:5.11K OHM,1%,0.125M,TC=TO (C-53 ONLY)	19701	5033ED5K110F
A1R24	321-0284-00			RES,FXD,FILM:8.87K OHM,1%,0.125M,TC=TO	19701	5043ED8K870F
A1R25	321-0315-00			RES,FXD,FILM:18.7K OHM,1%,0.125M,TC=TO	19701	5043ED18K70F
A1R26	321-0344-00			RES,FXD,FILM:37.4K OHM,1%,0.125M,TC=TO	19701	5033ED 37K40F
A1R27	321-0373-00			RES,FXD,FILM:75.0K OHM,1%,0.125M,TC=TO	19701	5033ED75K00F
A1R28	323-0402-00			RES,FXD,FILM:150K OHM,1%,0.5M,TC=TO	75042	CECTO-1503F
A1R29	323-0431-00			RES,FXD,FILM:301K OHM,1%,0.5M,TC=TO	19701	5053RD301K0F
A1R30	315-0104-00			RES,FXD,FILM:100K OHM,5%,0.25M	57668	NTR25J-E100K
A1R32	315-0474-00			RES,FXD,FILM:470K OHM,5%,0.25M	19701	5043CX470K0J92U
A1R34	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25M	57668	NTR25J-E 100E
A1R35	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25M	57668	NTR25J-E01K0
A1R36	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25M	19701	5043CX10K00J

Replaceable Electrical Parts  
C-50 Series Camera

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1R37	321-0218-00			RES,FXD,FILM:1.82K OHM,1%,0.125M,TC=TO	19701	5033ED1K82F
A1R38	321-0258-00			RES,FXD,FILM:4.75K OHM,1%,0.125M,TC=TO	19701	5033ED4K750F
A1R43	315-0101-00	8010100	8029999	RES,FXD,FILM:100 OHM,5%,0.25M	57668	NTR25J-E 100E
A1R43	315-0105-00	8030000		RES,FXD,FILM:1M OHM,5%,0.25M	19701	5043CX1M000J
A1R44	315-0471-00			RES,FXD,FILM:470 OHM,5%,0.25M	57668	NTR25J-E470E
A1R46	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25M	57668	NTR25JE01K0
A1R47	315-0123-00			RES,FXD,FILM:12K OHM,5%,0.25M	57668	NTR25J-E12K0
A1R48	315-0182-00			RES,FXD,FILM:1.8K OHM,5%,0.25M	57668	NTR25J-E1K8
A1R49	315-0682-00			RES,FXD,FILM:6.8K OHM,5%,0.25M	57668	NTR25J-E06K8
A1R50	315-0752-00			RES,FXD,FILM:7.5K OHM,5%,0.25M	57668	NTR25J-E07K5
A1R51	315-0223-00			RES,FXD,FILM:22K OHM,5%,0.25M	19701	5043CX22K00J92U
A1R53	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25M	19701	5043CX10K00J
A1R56	315-0104-00	8010100	8051519	RES,FXD,FILM:100K OHM,5%,0.25M (C-50 ONLY)	57668	NTR25J-E100K
A1R56	315-0103-00	8051520		RES,FXD,FILM:10K OHM,5%,0.25M (C-50 ONLY)	19701	5043CX10K00J
A1R56	315-0104-00	8010100	8051899	RES,FXD,FILM:100K OHM,5%,0.25M (C-51 ONLY)	57668	NTR25J-E100K
A1R56	315-0103-00	8051900		RES,FXD,FILM:10K OHM,5%,0.25M (C-51 ONLY)	19701	5043CX10K00J
A1R56	315-0104-00	8010100	8050519	RES,FXD,FILM:100K OHM,5%,0.25M (C-52 ONLY)	57668	NTR25J-E100K
A1R56	315-0103-00	8050520		RES,FXD,FILM:10K OHM,5%,0.25M (C-52 ONLY)	19701	5043CX10K00J
A1R56	315-0104-00	8010100	8051069	RES,FXD,FILM:100K OHM,5%,0.25M (C-53 ONLY)	57668	NTR25J-E100K
A1R56	315-0103-00	8051070		RES,FXD,FILM:10K OHM,5%,0.25M (C-53 ONLY)	19701	5043CX10K00J
A1R58	301-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.5M	19701	5053CX1K500J
A1R59	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25M	57668	NTR25JE01K0
A1R61	301-0270-00			RES,FXD,FILM:27 OHM,5%,0.5M	19701	5053CX27R00J
A1R70	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25M	57668	NTR25JE01K0
A1R71	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25M	19701	5043CX10K00J
A1R75	315-0471-00			RES,FXD,FILM:470 OHM,5%,0.25M	57668	NTR25J-E470E
A1R79	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25M	57668	NTR25JE01K0
A1R82	325-0022-00			RES,FXD,FILM:7.5 OHM,1%,0.5M	91637	A20-G7R500F
A1R83	315-0161-00			RES,FXD,FILM:160 OHM,5%,0.25M	57668	NTR25J-E 160E
A1R85	301-0101-00	8010100	8029999	RES,FXD,FILM:100 OHM,5%,0.5M	19701	5053CX100R0J
A1R85	301-0201-00	8030000		RES,FXD,FILM:200 OHM,5%,0.5M	19701	5053CX200R0J
A1R86	315-0272-00			RES,FXD,FILM:2.7K OHM,5%,0.25M	57668	NTR25J-E02K7
A1R88	304-0181-00			RES,FXD,CMPSN:180 OHM,10%,1M	01121	G81811
A1R89	315-0472-00	8010100	8029999	RES,FXD,FILM:4.7K OHM,5%,0.25M	57668	NTR25J-E04K7
A1R89	315-0202-00	8030000		RES,FXD,FILM:2K OHM,5%,0.25M	57668	NTR25J-E 2K
A1R91	315-0300-00			RES,FXD,FILM:30 OHM,5%,0.25M	19701	5043CX30R00J
A1R92	315-0104-00	8030000		RES,FXD,FILM:100K OHM,5%,0.25M	57668	NTR25J-E100K
A1R93	315-0432-00			RES,FXD,FILM:4.3K OHM,5%,0.25M	57668	NTR25J-E04K3
A1R94	315-0104-00			RES,FXD,FILM:100K OHM,5%,0.25M	57668	NTR25J-E100K
A1R95	315-0202-00	8010100	8029999	RES,FXD,FILM:2K OHM,5%,0.25M	57668	NTR25J-E 2K
A1VR93	152-0236-00			SEMICOND DVC,DI:ZEN,SI,12.5V,4%,0.4M,DO-7	04713	SZ13553RL
A2	670-1192-00			CIRCUIT BD ASSY:TIME SWITCH	80009	670-1192-00
A2S20	263-0512-00			SM SECTION,RTRY:1 POLE,12 POSN,C50	22753	SM-676(B)
C63	290-0443-00			CAP,FXD,ELCTLT:3000UF,+50-10%,20V	00853	057JL302T0208
C65	281-0549-00			CAP,FXD,CER DI:68PF,10%,500V	52763	2RDPLZ007 68P0KU
C77	290-0443-00			CAP,FXD,ELCTLT:3000UF,+50-10%,20V	00853	057JL302T0208
CR63	152-0066-00			SEMICOND DVC,DI:RECT,SI,400V,1A,DO-41	05828	GP10G-020
DS85	150-0045-00			LAMP,INCAND:5V,0.06A,#685,SUBMIDGET FLG	58361	CM-685
DS88	150-0045-00			LAMP,INCAND:5V,0.06A,#685,SUBMIDGET FLG	58361	CM-685
DS97	150-0103-00			LAMP,INCAND:12V,0.2A,#268,MDGT BAYONET	58451	PL10367
DS98	150-0097-01			LAMP,INCAND:6.3V,0.2A,#7381,FROSTED	08806	7381 FROSTED

Replaceable Electrical Parts  
C-50 Series Camera

Component No.	Tektronix Part No.	Serial/Assembly No.		Name & Description	Mfr. Code	Mfr. Part No.
		Effective	Discont			
0599	150-0097-01			LAMP, INCAND: 6.3V, 0.2A, #7381, FROSTED	08806	7381 FROSTED
F91	159-0094-00	8010100	8039999	FUSE, WIRE LEAD: 0.75A, 32V, 2SEC, 0.17IN PRLLD	80009	159-0094-00
F91	159-0025-00	8040000		FUSE, CARTRIDGE: 3AG, 0.5A, 250V, 0.25SEC	71400	AGC-CM-1/2
J1	131-0106-01			CONN, RCPT, ELEC: BNC, FEMALE	24931	28JR116-1
J40	131-0407-00			JACK, TELEPHONE: 2 COND OPEN OR SGL CLOSED	82389	TR-2A
J75	131-0858-00			CONN, RCPT, ELEC: MINTR HEX, 9 CONT FEMALE	80009	131-0858-00
J90	131-0407-00			JACK, TELEPHONE: 2 COND OPEN OR SGL CLOSED	82389	TR-2A
J91	131-0407-00			JACK, TELEPHONE: 2 COND OPEN OR SGL CLOSED	82389	TR-2A
L63	108-0584-00			COIL, SOLENOID:	80009	108-0584-00
L77	108-0584-00			COIL, SOLENOID:	80009	108-0584-00
L91	108-0205-00			COIL, RF: FIXED, 1MH	76493	8209
P10	131-0327-00			CONN, RCPT, ELEC: CKT 80, 15/30 CONT	05574	000201-2903
P75	131-0857-00			CONN, RCPT, ELEC: MINTR HEX, 9 CONT MALE	80009	131-0857-00
P99	131-0581-00			CONN, RCPT, ELEC: EDGE CARD, 6/12 CONT, 0.156 SP	23880	MM60/1-2TX
Q63	151-0141-01			TRANSISTOR: NPN, SI,	80009	151-0141-01
Q77	151-0141-01			TRANSISTOR: NPN, SI,	80009	151-0141-01
S18	260-1117-00			SWITCH, ROTARY: MODE	22753	SM-621(C)
S40	260-0975-00			SWITCH, SENS: SPDT, 10A, 250VAC	80009	260-0975-00
S90	-----			(SEE RMPL FOR REPL PARTS - SOLENOID ASSY)		
S97	-----			(SEE RMPL FOR REPLACEMENT PARTS - PHOTOMETER)		
S99	260-0612-00			SWITCH, SENS: SPDT, 7A, 230VAC OR 115 VAC	91929	15X1-T

# REPLACEABLE MECHANICAL PARTS

## PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

## SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number  
00X Part removed after this serial number

## FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

## INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

```

1 2 3 4 5      Name & Description
Assembly and/or Component
Attaching parts for Assembly and/or Component
    - - - * - - -
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
    - - - * - - -
Parts of Detail Part
Attaching parts for Parts of Detail Part
    - - - * - - -
  
```

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol - - - \* - - - indicates the end of attaching parts.

**Attaching parts must be purchased separately, unless otherwise specified.**

## ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

## ABBREVIATIONS

"	INCH	ELCTRN	ELECTRON	IN	INCH	SE	SINGLE END
#	NUMBER SIZE	ELEC	ELECTRICAL	INCAND	INCANDESCENT	SECT	SECTION
ACTR	ACTUATOR	ELCTLT	ELECTROLYTIC	INSUL	INSULATOR	SEMICOND	SEMICONDUCTOR
ADPTR	ADAPTER	ELEM	ELEMENT	INTL	INTERNAL	SHLD	SHIELD
ALIGN	ALIGNMENT	EPL	ELECTRICAL PARTS LIST	LPHLDR	LAMPHOLDER	SHLDR	SHOULDERED
AL	ALUMINUM	EQPT	EQUIPMENT	MACH	MACHINE	SKT	SOCKET
ASSEM	ASSEMBLED	EXT	EXTERNAL	MECH	MECHANICAL	SL	SLIDE
ASSY	ASSEMBLY	FIL	FILLISTER HEAD	MTG	MOUNTING	SLFLKG	SELF-LOCKING
ATTEN	ATTENUATOR	FLEX	FLEXIBLE	NIP	NIPPLE	SLVG	SLEEVING
AWG	AMERICAN WIRE GAGE	FLH	FLAT HEAD	NON WIRE	NOT WIRE WOUND	SPR	SPRING
BD	BOARD	FLTR	FILTER	OBD	ORDER BY DESCRIPTION	SQ	SQUARE
BRKT	BRACKET	FR	FRAME or FRONT	OD	OUTSIDE DIAMETER	SST	STAINLESS STEEL
BRS	BRASS	FSTNR	FASTENER	OVH	OVAL HEAD	STL	STEEL
BRZ	BRONZE	FT	FOOT	PH BRZ	PHOSPHOR BRONZE	SW	SWITCH
BSHG	BUSHING	FXD	FIXED	PL	PLAIN or PLATE	T	TUBE
CAB	CABINET	GSKT	GASKET	PLSTC	PLASTIC	TERM	TERMINAL
CAP	CAPACITOR	HDL	HANDLE	PN	PART NUMBER	THD	THREAD
CER	CERAMIC	HEX	HEXAGON	PNH	PAN HEAD	THK	THICK
CHAS	CHASSIS	HEX HD	HEXAGONAL HEAD	PWR	POWER	TNSN	TENSION
CKT	CIRCUIT	HEX SOC	HEXAGONAL SOCKET	RCPT	RECEPTACLE	TPG	TAPPING
COMP	COMPOSITION	HLCP	HELICAL COMPRESSION	RES	RESISTOR	TRH	TRUSS HEAD
CONN	CONNECTOR	HLEXT	HELICAL EXTENSION	RGD	RIGID	V	VOLTAGE
COV	COVER	HV	HIGH VOLTAGE	RLF	RELIEF	VAR	VARIABLE
CPLG	COUPLING	IC	INTEGRATED CIRCUIT	RTNR	RETAINER	W/	WITH
CRT	CATHODE RAY TUBE	ID	INSIDE DIAMETER	SCH	SOCKET HEAD	WSHR	WASHER
DEG	DEGREE	IDNT	IDENTIFICATION	SCOPE	OSCILLOSCOPE	XFMR	TRANSFORMER
DWR	DRAWER	IMPLR	IMPELLER	SCR	SCREW	XSTR	TRANSISTOR



CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
02107	SPARTA MFG CO	5200 N WOOSTER RD P O BOX 449	DOVER OH 44622
05469	BEARINGS INC	3634 EUCLID P O BOX 6925	CLEVELAND OH 44101
05574	VIKING CONNECTORS INC	21001 NORDHOFF ST	CHATSWORTH CA 91311
06915	RICHCO PLASTIC CO	5825 N TRIPP AVE	CHICAGO IL 60646
12327	FREEMAY CORP	9301 ALLEN DR	CLEVELAND OH 44125
18121	MILSHIRE FOAM PRODUCTS INC	1240 E 230TH ST	CARSON CA 90745
22526	DU PONT E I DE NEMOURS AND CO INC DU PONT CONNECTOR SYSTEMS	30 HUNTER LANE	CAMP HILL PA 17011
22753	UID SWITCHES INC DIV OF ILLINOIS TOOL WORKS INC	6615 M IRVING PARK RD	CHICAGO IL 60634
23880	STANFORD APPLIED ENGINEERING INC	340 MARTIN AVE	SANTA CLARA CA 95050
24931	SPECIALTY CONNECTOR CO INC	2620 ENDRESS PLACE P O BOX D	GREENWOOD IN 46142
42689	NATIONAL LOCK CO	1902 7TH	ROCKFORD IL 61101
71744	GENERAL INSTRUMENT CORP LAMP DIV	4433 N RAVENSMOOD AVE	CHICAGO IL 60640
71785	TRM INC TRM CINCH CONNECTORS	1501 MORSE AVE	ELK GROVE VILLAGE IL 60007
72228	AMCA INTERNATIONAL CORP CONTINENTAL SCREM CO DIV	459 MT PLEASANT	NEW BEDFORD MA 02742
73743	FISCHER SPECIAL MFG CO	446 MORGAN ST	CINCINNATI OH 45206
74445	HOLD-KROME CO	31 BROOK ST	WEST HARTFORD CT 06110
75915	LITTELFUSE INC	800 E NORTHWEST HWY	DES PLAINES IL 60016
76385	MINOR RUBBER CO INC	49 ACKERMAN ST	BLOOMFIELD NJ 07003
77250	ALLIED PRODUCTS CORP PHEOLL MFG CO DIV	5700 M ROOSEVELT RD	CHICAGO IL 60650
77900	SHAKEPROOF DIV OF ILLINOIS TOOL WORKS	SAINT CHARLES RD	ELGIN IL 60120
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIVISION	ST CHARLES ROAD	ELGIN IL 60120
79136	MALDES KOHINOOR INC	47-16 AUSTEL PLACE	LONG ISLAND CITY NY 11101
80009	TEKTRONIX INC	4900 S M GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
82389	SWITCHCRAFT INC SUB OF RAYTHEON CO	5555 N ELSTON AVE	CHICAGO IL 60630
83309	ELECTRICAL SPECIALTY CO SUBSIDIARY OF BELDEN CORP	213 E HARRIS AVE	SOUTH SAN FRANCISCO CA 94080
83385	MICRODOT MANUFACTURING INC GREER-CENTRAL DIV	3221 M BIG BEAVER RD	TROY MI 48098
86445	PENN FIBRE AND SPECIALTY CO INC	2032 E WESTMORELAND ST	PHILADELPHIA PA 19134
86928	SEASTROM MFG CO INC	701 SONORA AVE	GLENDALE CA 91201
88245	LITTON SYSTEMS INC USECO DIV	13536 SATICOY ST	VAN NUYS CA 91409
91506	AUGAT INC	33 PERRY AVE P O BOX 779	ATTLEBORO MA 02703
91929	HONEYWELL INC MICRO SWITCH DIV	11 M SPRING ST	FREEPORT IL 61032
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61101
95987	MECKESSER CO INC	4444 WEST IRVING PARK RD	CHICAGO IL 60641
96755	PACIFIC MOULDED PRODUCTS, COMPANY	905 E 59TH STREET	LOS ANGELES, CA 90001
TK0392	NORTHWEST FASTENER SALES INC	7923 SM CIRRRUS DRIVE	BEAVERTON OR 97005
TK0409	KEN R HUMKE CO	2211 NW NICOLAI	PORTLAND OR 97210
TK0433	PORTLAND SCREM CO	6520 N BASIN	PORTLAND OR 97217
TK0435	LEMIS SCREM CO	4114 S PEORIA	CHICAGO IL 60609
TK0878	JML OPTICAL INDUSTRIES INC	850 HUDSON AVE	ROCHESTER NY 14621
TK1280	GRAYBLOCK RIBBON CO INC	64-T M 36TH AVE	NEW YORK NY 10018

Replaceable Mechanical Parts  
C-50 Series Camera

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
1-1	337-0411-01	8010100	8089999	1	VISOR,CRT:	96755	ORDER BY DESCR
	337-0411-02	8090000		1	VISOR,CRT:	96755	31006-A1
	122-0943-00	8010100	8051138	1	OCCLUDER: (C-50 ONLY)	80009	122-0943-00
	122-0943-01	8051139	8089999	1	OCCLUDER: (C-50 ONLY)	80009	122-0943-01
	122-0943-02	8090000		1	OCCLUDER: (C-50 ONLY)	80009	122-0943-02
	122-0943-00	8010100	8051266	1	OCCLUDER: (C-51 ONLY)	80009	122-0943-00
	122-0943-01	8051267	8089999	1	OCCLUDER: (C-51 ONLY)	80009	122-0943-01
	122-0943-02	8090000		1	OCCLUDER: (C-51 ONLY)	80009	122-0943-02
	122-0943-00	8010100	8050353	1	OCCLUDER: (C-52 ONLY)	80009	122-0943-00
	122-0943-01	8050354	8089999	1	OCCLUDER: (C-52 ONLY)	80009	122-0943-01
	122-0943-02	8090000		1	OCCLUDER: (C-52 ONLY)	80009	122-0943-02
	122-0943-00	8010100	8050400	1	OCCLUDER: (C-53 ONLY)	80009	122-0943-00
	122-0943-01	8050401	8089999	1	OCCLUDER: (C-53 ONLY)	80009	122-0943-01
	122-0943-02	8090000		1	OCCLUDER: (C-53 ONLY)	80009	122-0943-02
-2	-----			1	.FRAME:(NOT REPLACEABLE)		
-3	-----			1	.SHIELD,DOOR:(NOT REPLACEABLE)		
-4	-----			1	.PIN,HINGE:(NOT REPLACEABLE)		
-5	366-0491-02	8010100	8051138	2	.KNOB:GRAY,0.127 ID X 0.706 OD X 0.65 H (C-50 ONLY)	80009	366-0491-02
	366-1054-00	8051139		2	.KNOB:GY,0.127 ID X 0.796 OD X 0.65 H (C-50 ONLY)	80009	366-1054-00
	366-0491-02	8010100	8051266	2	.KNOB:GRAY,0.127 ID X 0.706 OD X 0.65 H (C-51 ONLY)	80009	366-0491-02
	366-1054-00	8051267		2	.KNOB:GY,0.127 ID X 0.796 OD X 0.65 H (C-51 ONLY)	80009	366-1054-00
	366-0491-02	8010100	8050353	2	.KNOB:GRAY,0.127 ID X 0.706 OD X 0.65 H (C-52 ONLY)	80009	366-0491-02
	366-1054-00	8050354		2	.KNOB:GY,0.127 ID X 0.796 OD X 0.65 H (C-52 ONLY)	80009	366-1054-00
	366-0491-02	8010100	8050400	2	.KNOB:GRAY,0.127 ID X 0.706 OD X 0.65 H (C-53 ONLY)	80009	366-0491-02
	366-1054-00	8050401		2	.KNOB:GY,0.127 ID X 0.796 OD X 0.65 H (C-53 ONLY)	80009	366-1054-00
-6	213-0153-00			2	.SETSCREW:5-40 X 0.125,STL	TK0392	ORDER BY DESCR
	344-0042-00			2	.CLIP,SPR TNSN:LIGHT SHIELD,PH BRZ ATTACHING PARTS	80009	344-0042-00
-7	213-0119-00			4	.SCREW,TPG,TF:4-24 X 0.375,TYPE 8,PNH,STL END ATTACHING PARTS	83385	ORDER BY DESCR
-8	213-0104-00	8010100	8051139	2	.SCREW,TPG,TF:6-20 X 0.375,TYPE 8,TRH,STL (C-50 ONLY)	TK0435	1491-302
	213-0104-00	8010100	8051267	2	.SCREW,TPG,TF:6-20 X 0.375,TYPE 8,TRH,STL (C-51 ONLY)	TK0435	1491-302
	213-0104-00	8010100	8050354	2	.SCREW,TPG,TF:6-20 X 0.375,TYPE 8,TRH,STL (C-52 ONLY)	TK0435	1491-302
	213-0104-00	8010100	8050401	2	.SCREW,TPG,TF:6-20 X 0.375,TYPE 8,TRH,STL (C-53 ONLY)	TK0435	1491-302
-9	103-0102-00	8010100	8051138	1	ADPTR,CRT VISOR: (C-50 ONLY)	80009	103-0102-00
	103-0102-01	8051139		1	ADPTR,CRT VISOR: (C-50 ONLY)	80009	103-0102-01
	103-0102-00	8010100	8051266	1	ADPTR,CRT VISOR: (C-51 ONLY)	80009	103-0102-00
	103-0102-01	8051267		1	ADPTR,CRT VISOR: (C-51 ONLY)	80009	103-0102-01
	103-0102-00	8010100	8050353	1	ADPTR,CRT VISOR:	80009	103-0102-00

Replaceable Mechanical Parts  
C-50 Series Camera

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
1-	103-0102-01	8050354	1		(C-52 ONLY) ADPTR,CRT VISOR:	80009	103-0102-01
	103-0102-00	8010100 8050400	1		(C-52 ONLY) ADPTR,CRT VISOR:	80009	103-0102-00
	103-0102-01	8050401	1		(C-53 ONLY) ADPTR,CRT VISOR:	80009	103-0102-01
					(C-53 ONLY)		
					ATTACHING PARTS		
-10	213-0088-00		3		SCREW,TPG,TF:4-24 X 0.25,TYPE B,PNH	83385	ORDER BY DESCR
-11	344-0194-00		1		CLIP,SPR TNSN:CRT VISOR,PH BRZ CRPL	80009	344-0194-00
					END ATTACHING PARTS		
-12	252-0550-00		AR		RIBBON,TAFFETA:0.375 M,BLACK VELVET	TK1280	ORDER BY DESCR
-13	367-0119-00	8010100 8089999	1		HANDLE,CAMERA:5.0 L,AL BLUE VINYL PTD	80009	367-0119-00
	367-0119-03	8090000	1		HANDLE,CAMERA:5.0 L,AL,BLACK VINYL PTD	80009	367-0119-03
					ATTACHING PARTS		
-14	211-0079-00		2		SCREW,MACHINE:2-56 X 0.188,PNH,STL	TK0435	5549-418
-15	211-0510-00		2		SCREW,MACHINE:6-32 X 0.375,PNH,STL	83385	ORDER BY DESCR
					END ATTACHING PARTS		
-16	367-0118-00		2		PIVOT,ARM HDL:STAINLESS STEEL	80009	367-0118-00
					ATTACHING PARTS		
-17	210-1108-00		4		WSHR,SPR TNSN:0.161IDX0.240DX0.01THK,STL	78189	3502-07-07-0511
-18	211-0621-00		4		SCREW,EXT RLY:6-32 X 0.28,0.249 OD HD,SST	80009	211-0621-00
					END ATTACHING PARTS		
-19	426-0551-02	8010100 8081772	1		FRAME,CAMERA:	80009	426-0551-02
					(C-50 ONLY)		
	426-0551-04	8081773 8089999	1		FRAME,CAMERA:	80009	426-0551-04
					(C-50 ONLY)		
	426-0551-05	8090000	1		FRAME,CAMERA:	80009	426-0551-05
					(C-50 ONLY)		
	426-0551-02	8010100 8082352	1		FRAME,CAMERA:	80009	426-0551-02
					(C-51 ONLY)		
	426-0551-04	8082353 8089999	1		FRAME,CAMERA:	80009	426-0551-04
					(C-51 ONLY)		
	426-0551-05	8090000	1		FRAME,CAMERA:	80009	426-0551-05
					(C-51 ONLY)		
	426-0551-02	8010100 8080670	1		FRAME,CAMERA:	80009	426-0551-02
					(C-52 ONLY)		
	426-0551-04	8080671 8089999	1		FRAME,CAMERA:	80009	426-0551-04
					(C-52 ONLY)		
	426-0551-05	8090000	1		FRAME,CAMERA:	80009	426-0551-05
					(C-52 ONLY)		
	426-0551-02	8010100 8081801	1		FRAME,CAMERA:	80009	426-0551-02
					(C-53 ONLY)		
	426-0551-04	8081802 8089999	1		FRAME,CAMERA:	80009	426-0551-04
					(C-53 ONLY)		
	426-0551-05	8090000	1		FRAME,CAMERA:	80009	426-0551-05
					(C-53 ONLY)		
-20	407-0664-01		1		BRACKET,MIRROR:ALUMINUM	80009	407-0664-01
					ATTACHING PARTS		
-21	211-0087-00		2		SCREW,MACHINE:2-56 X 0.188,FLH,82 DEG	TK0435	ORDER BY DESCR
					END ATTACHING PARTS		
-22	122-0843-00		1		MIR,VIEWING SCR:1.5 X 0.625 X 0.04 GLASS	80009	122-0843-00
-23	200-1040-01	8010100 8089999	1		COVER,CAMERA FR:SIDE	80009	200-1040-01
	200-1040-05	8090000	1		COVER,CAMERA FR:SIDE	80009	200-1040-05
					ATTACHING PARTS		
-24	211-0014-00		4		SCREW,MACHINE:4-40 X 0.5,PNH,STL	TK0435	ORDER BY DESCR
					END ATTACHING PARTS		
-25	386-1647-00		1		PLATE,CONN MTG:ALUMINUM	80009	386-1647-00
					ATTACHING PARTS		
-26	213-0008-00		2		SCREW,TPG,TF:8 X 0.375,TYPE A,TRH,STL,POZ	77250	ORDER BY DESCR
					END ATTACHING PARTS		
-27	131-0581-00		1		CONN,RCPT,ELEC:EDGE CARD,6/12 CONT,0.156 SP	23880	MM60/1-2TX
					ATTACHING PARTS		
-28	211-0097-00		2		SCREW,MACHINE:4-40 X 0.312,PNH,STL	TK0435	ORDER BY DESCR
-29	210-0994-00		2		WASHER,FLAT:0.125ID X 0.2500 X 0.022	86928	A371-283-20
	210-0589-00		2		NUT,SFLKG,HEX:4-40 X 0.246,STL CD PL	TK0409	CF22NM40
					END ATTACHING PARTS		

Replaceable Mechanical Parts  
C-50 Series Camera

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
1-30	670-1135-00		1		CIRCUIT BD ASSY:SHUTTER CONTROL	80009	670-1135-00
-31	131-0787-00		5		.TERMINAL,PIN:0.64 L X 0.025 SQ PH BRZ	22526	47359-000
	131-0590-00		5		.TERMINAL,PIN:0.71 L X 0.025 SQ PH BRZ	80009	131-0590-00
-32	136-0350-00	8010100	10	8096979	.SKT,PL-IN ELEK:TRANSISTOR,3 CONTACT	80009	136-0350-00
	136-0252-07	8096980	30		.SOCKET,PIN CONN:M/O DIMPLE (C-51 ONLY)	22526	75060-012
	136-0350-00	8010100	10	8098819	.SKT,PL-IN ELEK:TRANSISTOR,3 CONTACT	80009	136-0350-00
	136-0252-07	8098820	30		.SOCKET,PIN CONN:M/O DIMPLE (C-53 ONLY)	22526	75060-012
-33	136-0365-00	8010100	3	8096979	.SKT,PL-IN ELEK:TRANSISTOR,3 CONTACT	80009	136-0365-00
	136-0252-07	8096980	9		.SOCKET,PIN CONN:M/O DIMPLE (C-51 ONLY)	22526	75060-012
	136-0365-00	8010100	3	8098819	.SKT,PL-IN ELEK:TRANSISTOR,3 CONTACT	80009	136-0365-00
	136-0252-07	8098820	9		.SOCKET,PIN CONN:M/O DIMPLE (C-53 ONLY)	22526	75060-012
-34	214-0579-00		4		.TERM,TEST POINT:BR5 CD PL	80009	214-0579-00
-35	348-0214-00	8010100	2	8089999	FOOT,CABINET:TEK BLUE,DELIRIN	80009	348-0214-00
	348-0214-01	8090000	2		FOOT,CABINET:BLACK DELIRIN ATTACHING PARTS	80009	348-0214-01
-36	211-0504-00	8010100	4	8094487	SCREW,MACHINE:6-32 X 0.250,PNH,STL (C-51 ONLY)	TK0435	ORDER BY DESCR
	213-0717-00	8094488	4		SCREW,TPG,TF:4-20 X 0.312,PNH,STL (C-51 ONLY)	72228	0004604M24
	211-0504-00	8010100	4	8095208	SCREW,MACHINE:6-32 X 0.250,PNH,STL (C-53 ONLY)	TK0435	ORDER BY DESCR
	213-0717-00	8095209	4		SCREW,TPG,TF:4-20 X 0.312,PNH,STL (C-53 ONLY)	72228	0004604M24
					END ATTACHING PARTS		
-37	348-0228-00		2		PAD,CAB.FOOT:BLACK POLURETHANE	80009	348-0228-00
-38	348-0215-00		2		PAD,CAB.FOOT:BLACK POLYURETHANE	80009	348-0215-00
-39	348-0736-00	8010100	1	8039999	GROMMET,RUBBER:BLACK,ROUND,1.0 ID (C-50 ONLY)	76385	Z-3097
	384-0736-02	8040000	1	8081772	SPACER,POST:5.187 L,0.312-18 ONE END,SST (C-50 ONLY)	80009	384-0736-02
	384-0736-04	8081773	1		ROD,SUPPORT:LEFT (C-50 ONLY)	80009	384-0736-04
	384-0736-00	8010100	1	8039999	SPACER,POST:5.187 L,0.312-18 ONE END,SST (C-51 ONLY)	80009	384-0736-00
	384-0736-02	8040000	1	8082352	SPACER,POST:5.187 L,0.312-18 ONE END,SST (C-51 ONLY)	80009	384-0736-02
	384-0736-04	8082353	1		ROD,SUPPORT:LEFT (C-51 ONLY)	80009	384-0736-04
	384-0736-00	8010100	1	8039999	SPACER,POST:5.187 L,0.312-18 ONE END,SST (C-52 ONLY)	80009	384-0736-00
	384-0736-02	8040000	1	8080670	SPACER,POST:5.187 L,0.312-18 ONE END,SST (C-52 ONLY)	80009	384-0736-02
	384-0736-04	8080671	1		ROD,SUPPORT:LEFT (C-52 ONLY)	80009	384-0736-04
	384-0736-00	8010100	1	8039999	SPACER,POST:5.187 L,0.312-18 ONE END,SST (C-53 ONLY)	80009	384-0736-00
	384-0736-02	8040000	1	8081801	SPACER,POST:5.187 L,0.312-18 ONE END,SST (C-53 ONLY)	80009	384-0736-02
	384-0736-04	8081802	1		ROD,SUPPORT:LEFT (C-53 ONLY)	80009	384-0736-04
					ATTACHING PARTS		
-40	213-0091-00	8010100	1	8039999	SCREW,MACHINE:0.312-18 X 0.5,BTNHD,STL	TK0428	ORDER BY DESCR
	213-0271-01	8040000	1		SCREW,MACHINE:0.312-18 X 0.75,BTNHD,STL	80009	213-0271-01
-41	210-0807-00	8010100	1	8039999	MSHR,FLAT:0.312ID X 0.62500 XC 0.05,STL	12327	ORDER BY DESCR
	210-1137-00	8040000	2		MSHR,RECESSED:0.316ID X 0.1240,SST,0.54 00 END ATTACHING PARTS	80009	210-1137-00
-42	214-1237-00		1		GEAR,BEVEL:24 TOOTH,ACETAL	80009	214-1237-00
-43	354-0380-00	8010100	1	8039999	RING,RETAINING:EXT CRESCENT,U/O 0.438 DIA	79136	5103-43SPP
-44	354-0381-00	8010100	4	8039999	RING,RETAINING:EXT CRESCENT,U/O 0.312 DIA	05469	5103-31-ST-ZD
-45	384-0735-00	8010100	1	8039999	SPACER,POST:5.125 L,0.312-18 ONE END,SST (C-50 ONLY)	80009	384-0735-00
	384-0735-02	8040000	1	8081772	SPACER,POST:5.125 L,0.312-18 ONE END,SST (C-50 ONLY)	80009	384-0735-02



Replaceable Mechanical Parts  
C-50 Series Camera

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-	384-0735-04	8081773	1	ROD,SUPPORT:RIGHT (C-50 ONLY)	80009	384-0735-04
	384-0735-00	8010100 8039999	1	SPACER,POST:5.125 L,0.312-18 ONE END,SST (C-51 ONLY)	80009	384-0735-00
	384-0735-02	8040000 H1K2352	1	SPACER,POST:5.125 L,0.312-18 ONE END,SST (C-51 ONLY)	80009	384-0735-02
	384-0735-04	8082353	1	ROD,SUPPORT:RIGHT (C-51 ONLY)	80009	384-0735-04
	384-0735-00	8010100 8039999	1	SPACER,POST:5.125 L,0.312-18 ONE END,SST (C-52 ONLY)	80009	384-0735-00
	384-0735-02	8040000 8080670	1	SPACER,POST:5.125 L,0.312-18 ONE END,SST (C-52 ONLY)	80009	384-0735-02
	384-0735-04	8080671	1	ROD,SUPPORT:RIGHT (C-52 ONLY)	80009	384-0735-04
	384-0735-00	8010100 8039999	1	SPACER,POST:5.125 L,0.312-18 ONE END,SST (C-53 ONLY)	80009	384-0735-00
	384-0735-02	8040000 8081801	1	SPACER,POST:5.125 L,0.312-18 ONE END,SST (C-53 ONLY)	80009	384-0735-02
	384-0735-04	8081802	1	ROD,SUPPORT:RIGHT (C-53 ONLY)	80009	384-0735-04
				ATTACHING PARTS		
-46	213-0091-00	8010100 8039999	2	SCREW,MACHINE:0.312-18 X 0.5,BTNHD,STL	TK0428	ORDER BY DESCR
	213-0271-01	8040000	1	SCREW,MACHINE:0.312-18 X 0.75,BTNHD,STL	80009	213-0271-01
-47	210-0807-00	8010100 8039999	1	MSHR,FLAT:0.312ID X 0.6250D XC 0.05,STL	12327	ORDER BY DESCR
	210-1137-00	8040000	2	MSHR,RECESSED:0.316ID X 0.124D,SST,0.54 00	80009	210-1137-00
				END ATTACHING PARTS		
	122-0978-00	8010100 8081772	1	ADAPTER,CAMERA: (C-50 ONLY)	80009	122-0978-00
	122-0978-01	8081773 8089999	1	ADAPTER,CAMERA: (C-50 ONLY)	80009	122-0978-01
	122-0978-02	8090000	1	ADAPTER,CAMERA: (C-50 ONLY)	80009	122-0978-02
	122-0978-00	8010100 8082352	1	ADAPTER,CAMERA: (C-51 ONLY)	80009	122-0978-00
	122-0978-01	8082353 8089999	1	ADAPTER,CAMERA: (C-51 ONLY)	80009	122-0978-01
	122-0978-02	8090000	1	ADAPTER,CAMERA: (C-51 ONLY)	80009	122-0978-02
	122-0978-00	8010100 8080670	1	ADAPTER,CAMERA: (C-52 ONLY)	80009	122-0978-00
	122-0978-01	8080671 8089999	1	ADAPTER,CAMERA: (C-52 ONLY)	80009	122-0978-01
	122-0978-02	8090000	1	ADAPTER,CAMERA: (C-52 ONLY)	80009	122-0978-02
	122-0978-00	8010100 8081801	1	ADAPTER,CAMERA: (C-53 ONLY)	80009	122-0978-00
	122-0978-01	8081802 8089999	1	ADAPTER,CAMERA: (C-53 ONLY)	80009	122-0978-01
	122-0978-02	8090000	1	ADAPTER,CAMERA: (C-53 ONLY)	80009	122-0978-02
-48	426-0560-02	8010100 8029999	1	.ADAPTER,CAMERA: (C-50 ONLY)	80009	426-0560-02
	426-0560-06	8030000 8081772	1	.ADAPTER,CAMERA: (C-50 ONLY)	80009	426-0560-06
	426-0560-07	8081773	1	.ADAPTER,CAMERA: (C-50 ONLY)	80009	426-0560-07
	426-0560-02	8010100 8029999	1	.ADAPTER,CAMERA: (C-51 ONLY)	80009	426-0560-02
	426-0560-06	8030000 8082352	1	.ADAPTER,CAMERA: (C-51 ONLY)	80009	426-0560-06
	426-0560-07	8082353	1	.ADAPTER,CAMERA: (C-51 ONLY)	80009	426-0560-07
	426-0560-02	8010100 8029999	1	.ADAPTER,CAMERA: (C-52 ONLY)	80009	426-0560-02
	426-0560-06	8030000 8080670	1	.ADAPTER,CAMERA: (C-52 ONLY)	80009	426-0560-06
	426-0560-07	8080671	1	.ADAPTER,CAMERA:	80009	426-0560-07

Replaceable Mechanical Parts  
C-50 Series Camera

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-	426-0560-02	8010100	8029999	1 .(C-52 ONLY) .ADAPTER,CAMERA: . (C-53 ONLY)	80009	426-0560-02
	426-0560-06	8030000	8081801	1 .ADAPTER,CAMERA: . (C-53 ONLY)	80009	426-0560-06
	426-0560-07	8081802		1 .ADAPTER,CAMERA: . (C-53 ONLY)	80009	426-0560-07
-49	214-0397-00			1 .PIN,STR,HOLS:0.25 DIA X 1.125 L,SST	80009	214-0397-00
-50	214-0398-00			1 .PIN,STR,HOLS:0.25 DIA X 1.0 L,SST	80009	214-0398-00
-51	131-0765-01			3 .TERM,FEEDTHRU:0.584 L X 0.625 OD,BRS	80009	131-0765-01
-52	352-0192-00			1 .HLD,FEEDTHRU:(3)ON 0.2 CTR,BLACK DELRIN ATTACHING PARTS	80009	352-0192-00
-53	211-0122-00	8010100	8094476	2 .SCREW,MACHINE:2-56 X 0.312,OVH,STL . (C-51 ONLY)	83385	ORDER BY DESCR
	211-0112-00	8094477		1 .SCREW,MACHINE:2-56 X 0.375,FLH,100 DEG,STL . (C-51 ONLY)	TK0435	ORDER BY DESCR
	211-0030-00			1 .SCREW,MACHINE:2-56 X 0.25,FLH,82 DEG,STL . (C-51 ONLY)	TK0435	ORDER BY DESCR
	211-0122-00	8010100	8095198	2 .SCREW,MACHINE:2-56 X 0.312,OVH,STL . (C-53 ONLY)	83385	ORDER BY DESCR
	211-0112-00	8095199		1 .SCREW,MACHINE:2-56 X 0.375,FLH,100 DEG,STL . (C-53 ONLY)	TK0435	ORDER BY DESCR
	211-0030-00			1 .SCREW,MACHINE:2-56 X 0.25,FLH,82 DEG,STL . (C-53 ONLY)	TK0435	ORDER BY DESCR
-54	391-0086-00			1 .BRACKET,CONN:PLSTC,1.15 X 0.445 X 0.345	80009	391-0086-00
	211-0030-00			1 .SCREW,MACHINE:2-56 X 0.25,FLH,82 DEG,STL END ATTACHING PARTS	TK0435	ORDER BY DESCR
-55	366-1154-00			1 .KNOB:GY,LATCH ATTACHING PARTS	80009	366-1154-00
-56	213-0223-00			1 .SCREW,SHOULDER:10-32X0.685,0.595 OD HD,BRS END ATTACHING PARTS	80009	213-0223-00
-57	122-0926-00	8010100	8059999	1 HOLDER,FILM: (C-50P ONLY)	80009	122-0926-00
	122-0926-01	8060000	8081935	1 HOLDER,FILM:M/BACK & MARKER (C-50P ONLY)	80009	122-0926-01
	122-0926-00	8081936	8093027	1 HOLDER,FILM: (C-50P ONLY)	80009	122-0926-00
	122-0926-01	8093028		1 HOLDER,FILM:M/BACK & MARKER (C-50P ONLY)	80009	122-0926-01
	122-0926-00	8010100	8059999	1 HOLDER,FILM: (C-51P ONLY)	80009	122-0926-00
	122-0926-01	8060000	8082578	1 HOLDER,FILM:M/BACK & MARKER (C-51P ONLY)	80009	122-0926-01
	122-0926-00	8082579	8094054	1 HOLDER,FILM: (C-51P ONLY)	80009	122-0926-00
	122-0926-01	8094055	8090949	1 HOLDER,FILM:M/BACK & MARKER (C-51P ONLY)	80009	122-0926-01
	122-0926-02	8090950		1 HOLDER,FILM: (C-51P ONLY)	80009	122-0926-02
	122-0926-01	8010100	8080745	1 HOLDER,FILM:M/BACK & MARKER (C-52P ONLY)	80009	122-0926-01
	122-0926-00	8080746	8092019	1 HOLDER,FILM: (C-52P ONLY)	80009	122-0926-00
	122-0926-01	8092020		1 HOLDER,FILM:M/BACK & MARKER (C-52P ONLY)	80009	122-0926-01
	122-0926-01	8010100	8082276	1 HOLDER,FILM:M/BACK & MARKER (C-53P ONLY)	80009	122-0926-01
	122-0926-00	8082277	8094310	1 HOLDER,FILM: (C-53P ONLY)	80009	122-0926-00
	122-0926-01	8094311	8096129	1 HOLDER,FILM:M/BACK & MARKER (C-53P ONLY)	80009	122-0926-01
	122-0926-02	8096130		1 HOLDER,FILM: (C-53P ONLY)	80009	122-0926-02
	401-0303-00			1 RLR,CAMERA BACK:RED	80009	401-0303-00
	401-0304-00			1 RLR,CAMERA BACK:TMO TONE GRAY	80009	401-0304-00
-57.1	122-0930-00			1 SLIDE,DARK:M/GRIP (SUB-PART OF 122-0926-02)	80009	122-0930-00

Replaceable Mechanical Parts  
C-50 Series Camera

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
1-58	352-0031-00		1		FUSEHOLDER,BLK:3AG,15A,250V	75915	357-001
-59	337-1204-00		1		SHIELD,LIGHT: (C-50 ONLY)	80009	337-1204-00
	337-1203-00		1		SHIELD,LIGHT: (C-51 ONLY)	80009	337-1203-00
	337-1437-01		1		SHIELD,LIGHT: (C-52 ONLY)	80009	337-1437-01
	337-1667-00		1		SHIELD,LIGHT:F1.4 LENS (C-53 ONLY)	80009	337-1667-00
-60	124-0178-00		1		STRIP,LT SEAL:15.0 X 0.187 X 0.125 (C-50 AND C-51 ONLY)	18121	ORDER BY DESCR
-61	200-1118-01		1		CAP,PROT,DUST &:	80009	200-1118-01
	016-0249-01	8010100	1	8020234	ADAPTER,CAMERA:TO 7000 SERIES MAINFRAMES (C-50 ONLY)	80009	016-0249-01
	016-0249-02	8020235	1	8029999	ADAPTER,CAMERA: (C-50 ONLY)	80009	016-0249-02
	016-0249-03	8030000	1		ADAPTER,CAMERA: (C-50 ONLY)	80009	016-0249-03
	016-0249-01	8010100	1	8020245	ADAPTER,CAMERA:TO 7000 SERIES MAINFRAMES (C-51 ONLY)	80009	016-0249-01
	016-0249-02	8020246	1	8029999	ADAPTER,CAMERA: (C-51 ONLY)	80009	016-0249-02
	016-0249-03	8030000	1		ADAPTER,CAMERA: (C-51 ONLY)	80009	016-0249-03
	103-0083-02		1		ADAPTER,CAMERA:	80009	103-0083-02
	214-0166-00		1		STRIKE,CATCH: ATTACHING PARTS	80009	214-0166-00
	211-0009-00		2		SCREW,MACHINE:4-40 X 0.25,OVH,STL END ATTACHING PARTS	83385	ORDER BY DESCR
	124-0178-00		1		STRIP,LT SEAL:15.0 X 0.187 X 0.125	18121	ORDER BY DESCR
	352-0193-00		1		HLDR,FEEDTHRU:(3)ON 0.2 CTR,BLACK DELRIN	80009	352-0193-00
	211-0012-00		2		SCREW,MACHINE:4-40 X 0.375,PNH,STL	TK0435	ORDER BY DESCR
	131-0887-00		3		TERM,FEEDTHRU:0.757 L X 0.097 OD,BRASS	80009	131-0887-00
	200-1028-00		1		COVER,TERM HLDR:1.21 X 0.43 X 0.13,PLASTIC	80009	200-1028-00
-62	366-1195-00		1		KNOB-SHAFT,LATC:0.2500X0.112L,M.8-32,SST	80009	366-1195-00
-63	210-0910-00		1		WASHER,FLAT:0.19 OD X 0.281 OD X 0.046	02107	S-47-11
-64	214-1301-00		1		SPRING,HLCPS:0.25 OD X 0.34 L,MUSIC WIRE	80009	214-1301-00
-65	105-0145-00		1		CATCH,CAMR LCH:BLACK ANODIZED	80009	105-0145-00
-66	354-0163-00		1		RING,RETAINING:TYPE E EXT,U/O 0.125 ID SFT	79136	5133-127D
-67	407-0695-00		1		BRACKET,LATCH:DELRIN,BLACK ATTACHING PARTS	80009	407-0695-00
-68	211-0012-00		2		SCREW,MACHINE:4-40 X 0.375,PNH,STL	TK0435	ORDER BY DESCR
-69	210-0586-00		2		NUT,PL,ASSEM MA:4-40 X 0.25,STL CO PL END ATTACHING PARTS	78189	211-041800-00
	103-0083-04		1		ADAPTER,CAMERA:	80009	103-0083-04
	214-0166-00		1		STRIKE,CATCH: ATTACHING PARTS	80009	214-0166-00
	211-0009-00		2		SCREW,MACHINE:4-40 X 0.25,OVH,STL END ATTACHING PARTS	83385	ORDER BY DESCR
	124-0178-00		1		STRIP,LT SEAL:15.0 X 0.187 X 0.125	18121	ORDER BY DESCR
	352-0193-00		1		HLDR,FEEDTHRU:(3)ON 0.2 CTR,BLACK DELRIN	80009	352-0193-00
	211-0012-00		2		SCREW,MACHINE:4-40 X 0.375,PNH,STL	TK0435	ORDER BY DESCR
	131-0887-00		3		TERM,FEEDTHRU:0.757 L X 0.097 OD,BRASS	80009	131-0887-00
	200-1028-00		1		COVER,TERM HLDR:1.21 X 0.43 X 0.13,PLASTIC	80009	200-1028-00
-70	213-0242-00		1		THUMBSCREEN:10-32 X 0.594,0.375 OD HD,SST	80009	213-0242-00
-71	210-1112-00		1		WASHER,FLAT:0.375 ID X 0.375 OD X 0.062	80009	210-1112-00
-72	343-0287-00		1		CLAMP,RIM CLENC:STAINLESS STEEL	80009	343-0287-00
-73	354-0324-00		1		RING,RETAINING:EXT TYPE E,U/O 0.14 DIA	79136	5133-14-ST-ZD
-74	380-0217-00		1		HOUSING,CLAMP:RIM CLENCHING,BLUE ACETAL ATTACHING PARTS	80009	380-0217-00
-75	213-0045-00		2		SCREW,TPG,TC:4-40 X 0.312,TYPE T,PNH,STL END ATTACHING PARTS	42689	ORDER BY DESCR
-76	103-0083-06		1		ADAPTER,CAMERA:	80009	103-0083-06
-77	214-0166-00		1		STRIKE,CATCH: ATTACHING PARTS	80009	214-0166-00
-78	211-0009-00		2		SCREW,MACHINE:4-40 X 0.25,OVH,STL END ATTACHING PARTS	83385	ORDER BY DESCR

Replaceable Mechanical Parts  
C-50 Series Camera

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont	Qty	12345    Name & Description	Mfr. Code	Mfr.    Part No.
1-79	122-0764-00		1	.GASKET,LT SHLD:CAMERA ADAPTER	80009	122-0764-00
-80	352-0193-00		1	.HLDR,FEEDTHRU:(3)ON 0.2 CTR,BLACK DELRIN	80009	352-0193-00
-81	211-0012-00		2	.SCREW,MACHINE:4-40 X 0.375,PNH,STL	TK0435	ORDER BY DESCR
-82	131-0887-00		3	.TERM,FEEDTHRU:0.757 L X 0.097 OD,BRASS	80009	131-0887-00
-83	200-1028-00		1	.COVER,TERM HLDR:1.21 X 0.43 X 0.13,PLASTIC	80009	200-1028-00
-84	213-0257-00		1	.THUMBSCREW:10-32 X 0.41,0.375 OD HD,SST	80009	213-0257-00
-85	210-1112-00		1	.WASHER,FLAT:0.375 ID X 0.375 OD X 0.062	80009	210-1112-00
-86	343-0301-00		1	.CLAMP,RIM CLENC:STAINLESS STEEL	80009	343-0301-00
-87	354-0324-00		1	.RING,RETAINING:EXT TYPE E,U/O 0.14 DIA	79136	5133-14-ST-ZD
-88	380-0228-00		1	.HOUSING,CLAMP:STAINLESS STL ATTACHING PARTS	80009	380-0228-00
-89	211-0007-00		2	.SCREW,MACHINE:4-40 X 0.188,PNH,STL END ATTACHING PARTS	TK0435	ORDER BY DESCR



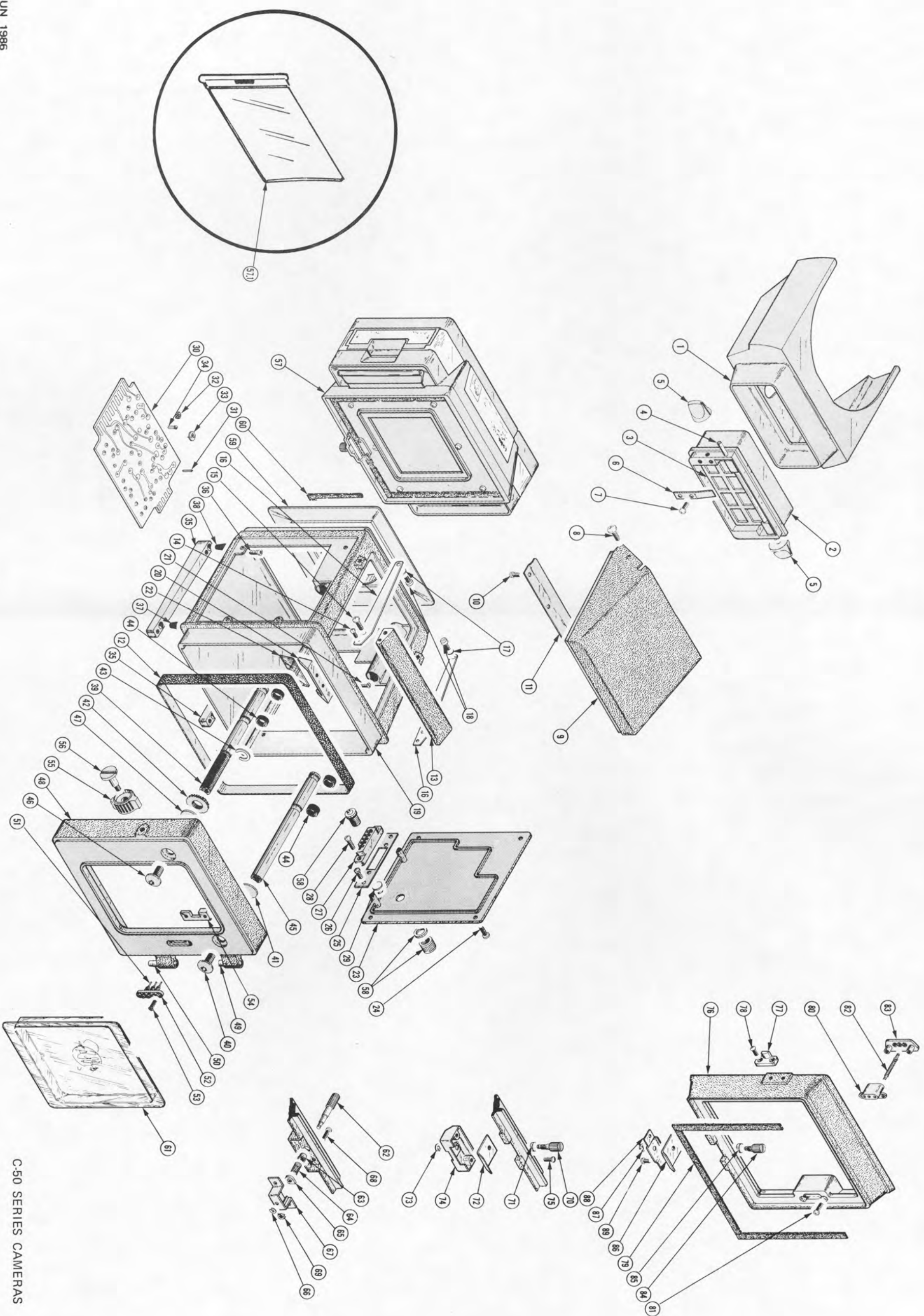
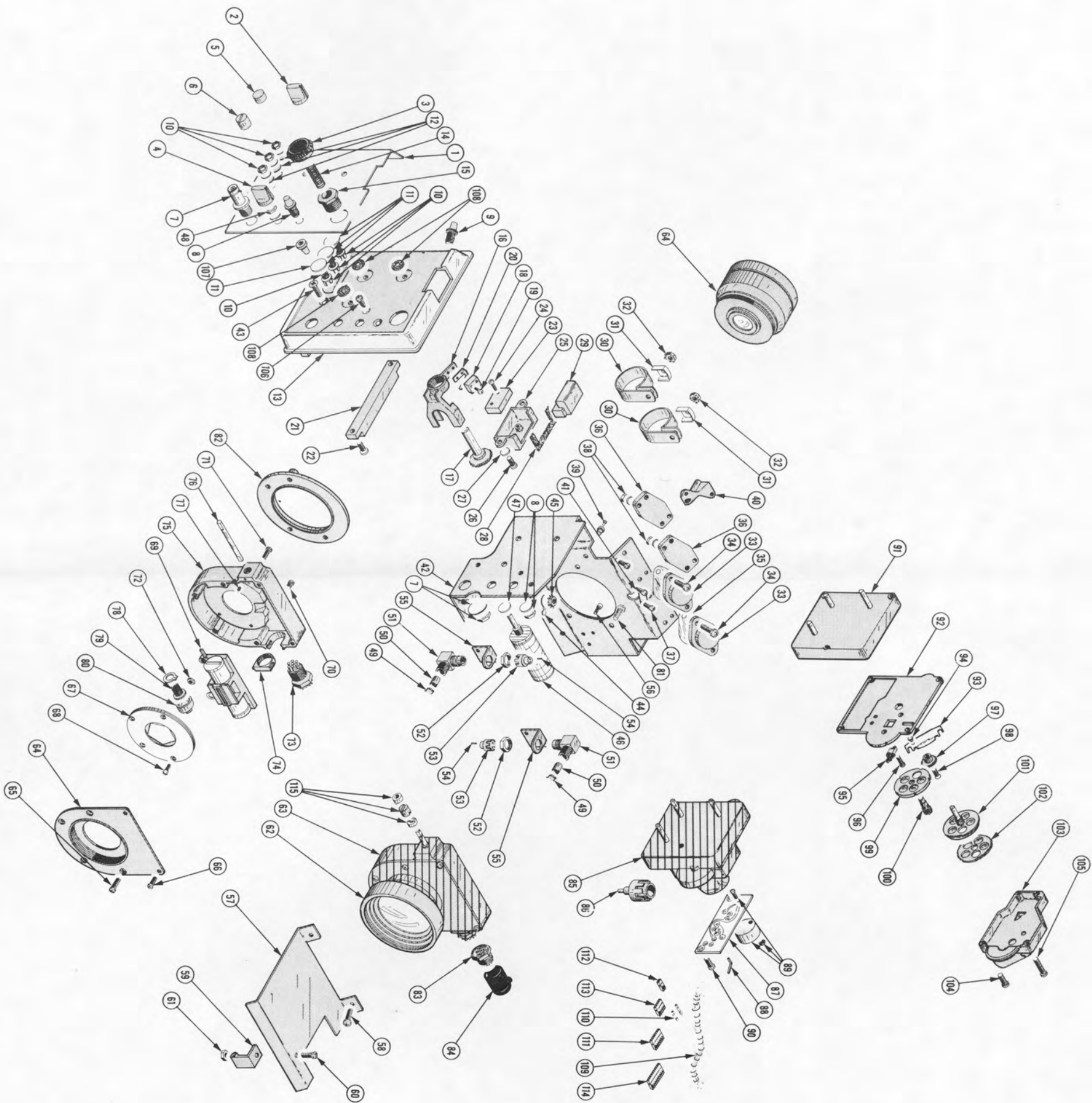


FIG. 1 FRAME

FIG. 2 CHASSIS



Replaceable Mechanical Parts  
C-50 Series Camera

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
2-1	333-1237-00		1		PANEL, FRONT: (C-50 ONLY)	80009	333-1237-00
	333-1237-01		1		PANEL, FRONT: (C-51 ONLY)	80009	333-1237-01
	333-1421-00		1		PANEL, FRONT: (C-52 ONLY)	80009	333-1421-00
	333-1627-00		1		PANEL, FRONT: (C-53 ONLY)	80009	333-1627-00
-2	366-0379-00		1		KNOB:GRAY, 0.127 ID X 0.5 OD X 0.93 H	80009	366-0379-00
	213-0153-00		1		.SETSCREW:5-40 X 0.125, STL	TK0392	ORDER BY DESCR
-3	366-1153-00		1		KNOB:	80009	366-1153-00
	213-0022-00		2		.SETSCREW:4-40 X 0.108, STL	74445	ORDER BY DESCR
-4	366-0491-02		1		KNOB:GRAY, 0.127 ID X 0.706 OD X 0.65 H	80009	366-0491-02
	213-0153-00		1		.SETSCREW:5-40 X 0.125, STL	TK0392	ORDER BY DESCR
-5	366-1182-00		1		KNOB:GY, 0.127 ID X 0.4 OD X 0.27 H	80009	366-1182-00
	213-0076-00		1		.SETSCREW:2-56 X 0.125, STL	74445	ORDER BY DESCR
-6	366-1177-00		1		KNOB:GY, 0.127 ID X 0.4 OD X 0.33 H	80009	366-1177-00
	213-0076-00		1		.SETSCREW:2-56 X 0.125, STL	74445	ORDER BY DESCR
-7	131-0106-01		1		CONN, RCPT, ELEC:BNC, FEMALE	24931	28JR116-1
	210-0014-00		1		ATTACHING PARTS WASHER, LOCK:0.385 ID EXT, 0.035 THK, STL	78189	1120-00
-8	136-0279-00		1		END ATTACHING PARTS LIGHT, INDICATOR:T-1 WIDGET FLANGE, GRN LENS	71744	5160-458-604G
-9	136-0382-00		1		LIGHT, INDICATOR:T-1 WIDGET FLANGE BASE	71744	5160-458-604-M
-10	131-0407-00		3		JACK, TELEPHONE:2 COND OPEN OR SGL CLOSED	82389	TR-2A
					ATTACHING PARTS		
-11	210-0813-00	8010100	3	8020314	WASHER, SHLDR:0.196 ID X 0.438 OD X 0.062	83309	ORDER BY DESCR
-12	210-1105-00	8010100	3	8020314	WASHER, FLAT:0.188 ID X 0.375 OD X 0.016NYL	86445	ORDER BY DESCR
	386-1836-00	8020315	1		(C-50 ONLY) PLATE, CONN MTG:	80009	386-1836-00
	210-1105-00	8010100	3	8020164	(C-50 ONLY) WASHER, FLAT:0.188 ID X 0.375 OD X 0.016NYL	86445	ORDER BY DESCR
	386-1836-00	8020165	1		(C-51 ONLY) PLATE, CONN MTG:	80009	386-1836-00
					(C-51 ONLY) END ATTACHING PARTS		
-13	386-1646-01	8010100	1	8089999	SUBPANEL, SIDE:	80009	386-1646-01
	386-1646-05	8090000	1		SUBPANEL, SIDE:	80009	386-1646-05
-14	214-1249-00		1		SPRING, HLCPS:0.31 OD X 0.9 L, CLOSED	80009	214-1249-00
-15	401-0066-00		1		BSHG, MACH THD:DELIN 0.562 ACROSS FLATS	80009	401-0066-00
-16	343-0232-01		1		RETAINER, GEAR:FOCUS ADJUST, AL PTD	80009	343-0232-01
-17	214-1263-00		1		GEAR, BEVEL:24 TOOTH, ACETAL	80009	214-1263-00
-18	260-0612-00		1		SWITCH, SENS:SPDT, 7A, 230VAC OR 115 VAC	91929	15X1-T
					ATTACHING PARTS		
-19	211-0089-00		2		SCREW, MACHINE:2-56 X 0.375, PNH, STL	TK0435	ORDER BY DESCR
					END ATTACHING PARTS		
-20	214-1311-00		1		ADAPTER, SW ACTR:FOCUS	91929	JX-44-B
-21	131-0327-00		1		CONN, RCPT, ELEC:CKT 8D, 15/30 CONT	05574	000201-2903
					ATTACHING PARTS		
-22	211-0121-00		2		SCR, ASSEM MSHR:4-40 X 0.438, PNH, BRS	TK0435	ORDER BY DESCR
					END ATTACHING PARTS		
-23	260-0975-00		1		SWITCH, SENS:SPDT, 10A, 250VAC	80009	260-0975-00
					ATTACHING PARTS		
-24	213-0181-00		2		SCREW, TPG, TF:2-32 X 0.375, TYPE B, PNH, STL	83385	ORDER BY DESCR
					END ATTACHING PARTS		
-25	380-0175-00		1		HSG, SHUTTER SM:BLACK DELRIN	80009	380-0175-00
					ATTACHING PARTS		
-26	211-0007-00		2		SCREW, MACHINE:4-40 X 0.188, PNH, STL	TK0435	ORDER BY DESCR
-27	210-0004-00		2		WASHER, LOCK:#4 INTL, 0.015 THK, STL	77900	1204-00-00-0541C
					END ATTACHING PARTS		
-28	122-0764-00		1		GASKET, LT SHLD:CAMERA ADAPTER	80009	122-0764-00
-29	366-1155-00		1		PUSH BUTTON:GRAY, 1.22 X 0.55 X 0.46	80009	366-1155-00
-30	343-0014-00		2		CLAMP, LOOP:1.0 ID, PLASTIC	06915	E16 (CLEAR)
					ATTACHING PARTS		
-31	210-0863-00		2		MSHR, LOOP CLAMP:0.187 ID U/M 0.5 M CLP	95987	C191
-32	210-0586-00		2		NUT, PL, ASSEM MA:4-40 X 0.25, STL CD PL	78189	211-041800-00
					END ATTACHING PARTS		



Replaceable Mechanical Parts  
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Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
2-33	---		2		TRANSISTOR: ATTACHING PARTS		
-34	211-0510-00		4		SCREW,MACHINE:6-32 X 0.375,PNH,STL	83385	ORDER BY DESCR
-35	386-0786-00		2		INSULATOR,PLATE:TRANSISTOR,MICA	80009	386-0786-00
	210-0811-00	8050000	4		MASHER,SHLDR:0.14ID X 0.31300X0.062THK,FBR	86928	5604-47
	210-0802-00	8050000	4		MASHER,FLAT:0.15 ID X 0.312 OD X 0.032,STL	12327	ORDER BY DESCR
	210-0202-00	8050000	2		TERMINAL,LUG:0.146 ID,LOCKING,BRZ TIN PL	86928	A-373-158-2
	210-0006-00	8050000	2		MASHER,LOCK:#6 INTL,0.018 THK,STL	77900	1206-00-00-0541C
	210-0407-00	8050000	4		NUT,PLAIN,HEX:6-32 X 0.25,BRS CD PL END ATTACHING PARTS	73743	3038-402
-36	136-0135-00	8010100	2		SKT,PL-IN ELEK:PMR TRANSISTOR,2 CONTACT ATTACHING PARTS	91506	8038-168
-37	211-0089-00	8010100	4		SCREW,MACHINE:2-56 X 0.375,PNH,STL	TK0435	ORDER BY DESCR
	210-0001-00	8010100	4		MASHER,LOCK:#2 INTL,0.013 THK,STL	77900	1202-00-00-0541C
-38	210-0405-00	8010100	4		NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL END ATTACHING PARTS	73743	12157-50
-39	131-0235-00		5		TERMINAL,STUD:0.455 L,BIFURCATED ATTACHING PARTS	88245	420977-9
	358-0176-00		5		INSULATOR,BSHG:0.075 ID X 0.203 OD X 0.215 END ATTACHING PARTS	88245	421472
-40	352-0229-00		1		HOLDER,LT CNDCT:BLACK DELIN ATTACHING PARTS	80009	352-0229-00
-41	213-0055-00		2		SCREW,TPG,TF:2-32 X 0.188,TYPE B,PNH,STL END ATTACHING PARTS	93907	ORDER BY DESCR
-42	441-0899-00		1		CHASSIS,CAMERA:SHUTTER,F=1.2 LENS (C-50,C-51,C-53 ONLY)	80009	441-0899-00
	441-0905-01		1		CHASSIS,CAMERA:SHUTTER,F=1.4 LENS (C-52 ONLY)	80009	441-0905-01
	441-1002-00		1		CHASSIS,CAMERA:SHUTTER HALF,F=1.4 (C-52 ONLY) ATTACHING PARTS	80009	441-1002-00
-43	211-0538-00		2		SCREW,MACHINE:6-32 X 0.312,FLH,100 DEG END ATTACHING PARTS	93907	ORDER BY DESCR
-44	210-0205-00		1		TERMINAL,LUG:0.172 ID,LOCKING,BRS TIN PL ATTACHING PARTS	86928	5442-7
-45	210-0458-00		1		NUT,PL,ASSEM MA:8-32 X 0.344,STL CD PL END ATTACHING PARTS	78189	511-081800-00
-46	260-1117-00		1		SWITCH,ROTARY:MODE ATTACHING PARTS	22753	SM-621(C)
-47	210-0046-00		1		MASHER,LOCK:0.261 ID,INTL,0.018 THK,STL	77900	1214-05-00-0541C
	210-0940-00		1		MASHER,FLAT:0.25 ID X 0.375 OD X 0.02	12327	ORDER BY DESCR
-48	211-01583-00		1		NUT,PLAIN,HEX:0.25-32 X 0.312,BRS CD PL END ATTACHING PARTS	73743	2X-20319-402
	122-0969-01		2		FOCUS LT ASSY:	80009	122-0969-01
	122-0893-00		2		.LENS,CAMERA:LIGHT FOCUSING	80009	122-0893-00
-49	386-1632-00		2		.PLATE,FOCUSING:CU BE	80009	386-1632-00
-50	122-0844-00		2		.DIFFUSER,LIGHT:	80009	122-0844-00
-51	352-0194-00		2		.HLDR,LAMP-LENS:FOCUSING LAMP,BRS CRPL C50	80009	352-0194-00
-52	210-0590-00		2		.NUT,PLAIN,HEX:0.375-32 X 0.438 BRS CD PL	73743	28269-402
-53	352-0188-00		4		LAMPHOLDER:(1)WIRE LEAD INCANDESCENT	80009	352-0188-00
-54	131-0856-00		4		CONTACT,ELEC:LIGHT	71785	413-17-14-114
-55	407-0688-00		2		BRACKET,LAMP:ALUMINUM ATTACHING PARTS	80009	407-0688-00
-56	211-0001-00		6		SCREW,MACHINE:2-56 X 0.25,PNH,STL END ATTACHING PARTS	TK0435	ORDER BY DESCR
-57	337-1267-00		1		SHIELD,LIGHT:CKT BD (C-50 AND C-51 ONLY)	80009	337-1267-00
	337-1438-00		1		SHIELD,LIGHT: (C-52 ONLY)	80009	337-1438-00
	337-1267-01		1		SHIELD,LIGHT:CKT BD (C-53 ONLY) ATTACHING PARTS	80009	337-1267-01
-58	211-0065-00		2		SCREW,MACHINE:4-40 X 0.188,PNH,STL END ATTACHING PARTS	TK0435	ORDER BY DESCR
-59	344-0132-00		1		CLIP,SPR TNSN:CKT BOARD MT,ACETAL BLACK ATTACHING PARTS	80009	344-0132-00
-60	211-0177-00		1		SCREW,MACHINE:4-40 X 0.312,PNH,STL	TK0435	ORDER BY DESCR



Replaceable Mechanical Parts  
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Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont		Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
2-61	210-0586-00			1		NUT, PL, ASSEM MA:4-40 X 0.25, STL CD PL END ATTACHING PARTS	78189	211-041800-00
-62	122-0885-00			1		LENS, CAMERA: F1.9, 56MM (C-50 ONLY)	80009	122-0885-00
	122-0884-00			1		LENS, CAMERA: F1.2, 56MM (C-51 ONLY)	80009	122-0884-00
	122-0948-00			1		LENS, CAMERA: F1.4, 60MM (C-52 ONLY)	80009	122-0948-00
	122-0956-00			1		LENS, CAMERA: F1.9, 56MM (C-53 ONLY)	TK0878	8-53810-1
-63	122-0936-00			1		SHUTTER, PHOTO: (C-50 AND C-53 ONLY)	80009	122-0936-00
	122-0937-00			1		SHUTTER, PHOTO: (C-51 ONLY)	80009	122-0937-00
	122-0950-00			1		SHUTTER, PHOTO: (C-52 ONLY)	80009	122-0950-00
-64	380-0186-01			1		.HSG HALF, SHTR A: FRONT, ALUMINUM ATTACHING PARTS	80009	380-0186-01
-65	211-0008-00			4		.SCREN, MACHINE: 4-40 X 0.25, PNH, STL	93907	ORDER BY DESC
-66	211-0001-00			2		.SCREN, MACHINE: 2-56 X 0.25, PNH, STL END ATTACHING PARTS	TK0435	ORDER BY DESC
-67	122-0934-00			1		.SHUTTER, PHOTO: M/RINGS AND SHIELDS (122-0936-00 AND 122-0937-00 ONLY)	80009	122-0934-00
	122-0934-01			1		.SHUTTER, PHOTO: (122-0950-00 ONLY)	80009	122-0934-01
-68	211-0069-00	B010100	B026866	4		.SCREN, MACHINE: 2-56 X 0.125, PNH, STL (C-51 ONLY)	TK0435	ORDER BY DESC
	211-0069-00	B010100	B098655	4		SCREN, MACHINE: 2-56 X 0.125, PNH, STL	TK0435	ORDER BY DESC
	211-0108-00	B098656		4		SCREN, MACHINE: 2-56 X 0.156, PNH, STL (C-53 ONLY)	TK0435	ORDER BY DESC
-69	122-0935-00			1		END ATTACHING PARTS .SOLENOID, ELEC: SHUTTER	80009	122-0935-00
-70	211-0069-00			3		.SCREN, MACHINE: 2-56 X 0.125, PNH, STL	TK0435	ORDER BY DESC
-71	211-0001-00			1		.SCREN, MACHINE: 2-56 X 0.25, PNH, STL	TK0435	ORDER BY DESC
-72	210-0405-00			1		.NUT, PLAIN, HEX: 2-56 X 0.188, BRS CD PL END ATTACHING PARTS	73743	12157-50
-73	131-0857-00			1		.CONN, RCPT, ELEC: MINTR HEX, 9 CONT MALE	80009	131-0857-00
-74	377-0292-00			1		.INSERT, SCR THD: 0.5-20X0.558X0.634, PLSTC	80009	377-0292-00
-75	380-0187-01			1		.HSG HALF, SHTR A: REAR, ALUMINUM	80009	380-0187-01
-76	384-1003-00			1		.EXTENSION SHAFT: 1.18 L X 0.125 OD SST (122-0936-00 ONLY)	80009	384-1003-00
	384-0498-00			1		.EXTENSION SHAFT: 1.18 L X 0.125 OD, SST (122-0937-00 ONLY)	80009	384-0498-00
-77	213-0195-00			1		.SETSCREN: 2-56 X 0.188, STL	TK0392	ORDER BY DESC
-78	354-0376-00			1		.RING, RETAINING: BASIC INT, 0.375 HSG ID	79136	N5000-37-ST-ZD
-79	358-0392-00			1		.BUSHING, SHAFT: 0.25-32 X 0.39 L, BRS (122-0936-00 ONLY)	80009	358-0392-00
	358-0392-00			1		.BUSHING, SHAFT: 0.25-32 X 0.39 L, BRS (122-0937-00 ONLY)	80009	358-0392-00
	105-0213-00			1		.STOP, CAM: F-STOP ADJ, (C-52 ONLY)	80009	105-0213-00
	211-0069-00			2		ATTACHING PARTS .SCREN, MACHINE: 2-56 X 0.125, PNH, STL	TK0435	ORDER BY DESC
-80	401-0073-00			1		END ATTACHING PARTS .CAM, F-STOP ADJ: DELRIN, 56MM, F1.9 (122-0936-00 ONLY)	80009	401-0073-00
	401-0075-00			1		.CAM, F-STOP ADJ: DELRIN, 56MM, F1.2 (122-0937-00 ONLY)	80009	401-0075-00
	401-0122-00			1		.CAM, F-STOP ADJ: 60 MM, F1.4 (122-0950-00 ONLY)	80009	401-0122-00
-81	211-0008-00			4		ATTACHING PARTS SCREN, MACHINE: 4-40 X 0.25, PNH, STL	93907	ORDER BY DESC
	211-0115-00			4		SCREN, MACHINE: 2-56 X 0.5, OVH, STL	80009	211-0115-00
	210-0802-00			4		WASHER, FLAT: 0.15 ID X 0.312 OD X 0.032, STL (122-0936-00 ONLY)	12327	ORDER BY DESC

Replaceable Mechanical Parts  
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Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont		Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
2-82	361-0313-00			1		SPACER,SLEEVE:0.267 L X 2.0 ID,BLK DELRIN (122-0936-00 ONLY) END ATTACHING PARTS	80009	361-0313-00
-83	131-0858-00			1		CONN,RCPT,ELEC:MINTR HEX,9 CONT FEMALE	80009	131-0858-00
-84	200-1092-00			1		SHLD,ELEC CONN:0.48 ID X 0.55 D,VINYL	80009	200-1092-00
-85	122-0940-00			1		PHOTOMETER: (C-50 ONLY)	80009	122-0940-00
	122-0939-00			1		PHOTOMETER: (C-51 ONLY)	80009	122-0939-00
	122-0951-00			1		PHOTOMETER: (C-52 ONLY)	80009	122-0951-00
	122-0962-00			1		PHOTOMETER: (C-53 ONLY)	80009	122-0962-00
	401-0110-00			2		.GEAR,SPUR:AL,24 TEETH (C-52 ONLY)	80009	401-0110-00
	401-0111-00			1		.GEAR,SPUR:AL,48 TEETH (C-52 ONLY)	80009	401-0111-00
	401-0170-00			2		.GEAR,SPUR:18 TEETH,0.281 PITCH DIA (C-53 ONLY)	80009	401-0170-00
	401-0171-00			1		.GEAR,SPUR:NYLON,36 TEETH,0.562 PITCH DIA (C-53 ONLY)	80009	401-0171-00
	407-0923-00			1		.BRACKET,GEAR:BRASS,BLK CHROME (C-52 ONLY)	80009	407-0923-00
	407-1105-00			1		.BRACKET,GEAR PL:ALUMINUM (C-53 ONLY)	80009	407-1105-00
-86	136-0379-00			1		.LAMPHOLDER:1 G-3 1/2 LAMP	80009	136-0379-00
-87	670-1192-00			1		.CIRCUIT BD ASSY:TIME SWITCH	80009	670-1192-00
-88	131-0608-00			12		..TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-89	263-0512-00			1		..SM SECTION,RTRY:1 POLE,12 POSN,C50 ATTACHING PARTS	22753	SM-676(B)
-90	211-0177-00			2		.SCREW,MACHINE:4-40 X 0.312,PNH,STL END ATTACHING PARTS	TK0435	ORDER BY DESCR
-91	380-0172-00			1		.HSG,GEAR TRAIN:POLYCARBONATE (C-50 ONLY)	80009	380-0172-00
	361-0287-00	8010100	8010153	1		.SPACER,GEAR:1.01 L X 0.25 M,SST (C-50 ONLY)	80009	361-0287-00
	105-0210-00	8010154		1		.STOP,SHAFT:F-STOP ADJ (C-50 ONLY)	80009	105-0210-00
	361-0287-00	8010100	8010156	1		.SPACER,GEAR:1.01 L X 0.25 M,SST (C-52 ONLY)	80009	361-0287-00
	105-0210-00	8010157		1		.STOP,SHAFT:F-STOP ADJ (C-52 ONLY)	80009	105-0210-00
	213-0140-00			2		..SETSCREW:2-56 X 0.094,STL (C-50 ONLY)	TK0433	ORDER BY DESCR
	211-0022-00	8010154		2		.SCREW,MACHINE:2-56 X 0.188,PNH,STL (C-50 ONLY)	TK0435	ORDER BY DESCR
	211-0022-00	8010157		2		.SCREW,MACHINE:2-56 X 0.188,PNH,STL (C-52 ONLY)	TK0435	ORDER BY DESCR
	105-0201-00	8010100	8010153	1		.STOP,GEAR:FOCUS ADJ,AL (C-50 ONLY)	80009	105-0201-00
	105-0209-00	8010154		1		.STOP,GEAR:FOCUS ADJ (C-50 ONLY)	80009	105-0209-00
	105-0201-00	8010100	8010156	1		.STOP,GEAR:FOCUS ADJ,AL (C-52 ONLY)	80009	105-0201-00
	105-0209-00	8010157		1		.STOP,GEAR:FOCUS ADJ (C-52 ONLY)	80009	105-0209-00
-92	200-1018-01			1		.COVER,GEAR HSG:2.987 X 2.7 X 0.13,PLASTIC	80009	200-1018-01
-93	214-1262-00			1		.ARM,ACTUATOR:1.52 X 0.3 X 0.15,SST	80009	214-1262-00
-94	361-0134-00			1		.SPACER,STANDOFF:0.16 L X 0.156 OD,TEFLON	80009	361-0134-00
-95	214-1223-00			1		.INDEX,DETENT:FILTER DISC HOLDER ATTACHING PARTS	80009	214-1223-00
-96	211-0079-00			2		.SCREW,MACHINE:2-56 X 0.188,PNH,STL END ATTACHING PARTS	TK0435	5549-418
-97	214-1241-00			1		.GEAR,SPUR:36 TOOTH,ACETAL ATTACHING PARTS	80009	214-1241-00
-98	211-0087-00			1		.SCREW,MACHINE:2-56 X 0.188,FLH,82 DEG END ATTACHING PARTS	TK0435	ORDER BY DESCR

Replaceable Mechanical Parts  
C-50 Series Camera

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont		Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
2-99	378-0646-00			1		.FILTER,LT,PHOTO:PHOSPHOR MATCHING	80009	378-0646-00
-100	214-1238-00			1		.GEAR,SPUR:12 TOOTH,ACETAL	80009	214-1238-00
-101	378-0645-00			1		.FILTER,LT,PHOTO:	80009	378-0645-00
-102	378-0644-00			1		.FILTER,LT,PHOTO:	80009	378-0644-00
-103	200-1017-00			1		.COVER,ATTEN:	80009	200-1017-00
						ATTACHING PARTS		
-104	211-0178-00			1		.SCREW,MACHINE:4-40 X 0.75,PNH,STL	80009	211-0178-00
-105	211-0176-00			3		.SCREW,MACHINE:2-56 X 0.5,PNH,STL	83385	ORDER BY DESCR
-106	211-0065-00			3		SCREW,MACHINE:4-40 X 0.188,PNH,STL	TK0435	ORDER BY DESCR
						END ATTACHING PARTS		
-107	358-0407-00			1		BUSHING,LT SEAL:VINYL	80009	358-0407-00
-108	214-1288-00	8010100	8020314	3		GASKET:LIGHT SEAL,FELT	80009	214-1288-00
	214-1288-00	8020315		2		GASKET:LIGHT SEAL,FELT	80009	214-1288-00
	214-1288-00	8010100	8020164	3		GASKET:LIGHT SEAL,FELT	80009	214-1288-00
	214-1288-00	8020165		2		GASKET:LIGHT SEAL,FELT	80009	214-1288-00
-109	179-1492-00	8010100	8010127	1		MIRING HARNESS:CONTROL PNL NO 1	80009	179-1492-00
	179-1547-00	8010128		1		MIRING HARNESS:CONTROL PANEL NO 1 & NO 2	80009	179-1547-00
	179-1492-00	8010100	8010130	1		MIRING HARNESS:CONTROL PNL NO 1	80009	179-1492-00
	179-1547-00	8010131		1		MIRING HARNESS:CONTROL PANEL NO 1 & NO 2	80009	179-1547-00
-110	131-0707-00			6		.CONTACT,ELEC:22-26 AWG,BRS,CU BE GLD PL	22526	47439-000
-111	352-0165-00			1		.HLDR,TERM CONN:7 WIRE,BLACK	80009	352-0165-00
	352-0171-00			1		.HLDR,TERM CONN:1 WIRE,BLACK	80009	352-0171-00
-112	352-0169-00			1		.HLDR,TERM CONN:2 WIRE,BLACK	80009	352-0169-00
	179-1493-00	8010100	8010127	1		MIRING HARNESS:CONTROL PNL NO 2	80009	179-1493-00
	179-1493-00	8010100	8010130	1		MIRING HARNESS:CONTROL PNL NO 2	80009	179-1493-00
	179-1548-00			1		MIRING HARNESS:SHUTTER CONTROL	80009	179-1548-00
-113	131-0707-00			19		.CONTACT,ELEC:22-26 AWG,BRS,CU BE GLD PL	22526	47439-000
	352-0153-00	8010100	8010149	2		.FUSEHOLDER:TELEQUIPMENT	80009	352-0153-00
	352-0163-00	8010150		2		.(C-50 AND C-51 ONLY)	80009	352-0163-00
	352-0163-01	8010150		1		.HLDR,TERM CONN:5 WIRE,BROWN	80009	352-0163-01
-114	352-0167-00			1		.(C-50 AND C-51 ONLY)	80009	352-0167-00
-115	376-0099-00			1		.HLDR,TERM CONN:9 WIRE,BLACK	80009	376-0099-00
				1		CPLG,SHAFT,FLEX:0.125 ID X 0.25 OD,	80009	376-0099-00

Replaceable Mechanical Parts  
C-50 Series Camera

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont		Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
3-								
						STANDARD ACCESSORIES		
	070-1011-03			1		MANUAL, TECH: INSTR	80009	070-1011-03
						OPTIONAL ACCESSORIES		
	200-1041-00			1		COVER, CAMERA FR: TOP	80009	200-1041-00



# SECTION 11

## DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

### Symbols and Reference Designators

Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF).  
Values less than one are in microfarads ( $\mu$ F).  
Resistors = Ohms ( $\Omega$ ).

Symbols used on the diagrams are based on ANSI Standard Y32.2-1975.

Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The following prefix letters are used as reference designators to identify components or assemblies on the diagrams.

A	Assembly, separable or repairable (circuit board, etc.)	H	Heat dissipating device (heat sink, heat radiator, etc.)	S	Switch or contactor
AT	Attenuator, fixed or variable	HR	Heater	T	Transformer
B	Motor	HY	Hybrid circuit	TC	Thermocouple
BT	Battery	J	Connector, stationary portion	TP	Test point
C	Capacitor, fixed or variable	K	Relay	U	Assembly, inseparable or non-repairable (integrated circuit, etc.)
CB	Circuit breaker	L	Inductor, fixed or variable	V	Electron tube
CR	Diode, signal or rectifier	M	Meter	VR	Voltage regulator (zener diode, etc.)
DL	Delay line	P	Connector, movable portion	W	Wirestrap or cable
DS	Indicating device (lamp)	Q	Transistor or silicon-controlled rectifier	Y	Crystal
E	Spark Gap	R	Resistor, fixed or variable	Z	Phase shifter
F	Fuse	RT	Thermistor		
FL	Filter				

The following special symbols are used on the diagrams:

